US009463942B2

(12) **United States Patent**
Yanez, Jr. et al.

(10) **Patent No.: US 9,463,942 B2**
(45) **Date of Patent: Oct. 11, 2016**

(54) **APPARATUS FOR POSITIONING AN ADVANCING WEB**

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(73) Assignee: **The Procter & Gamble Company**, Cincinnati, OH (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 375 days.

(21) Appl. No.: **14/034,593**

(22) Filed: **Sep. 24, 2013**

(65) **Prior Publication Data**

US 2015/0083848 A1 Mar. 26, 2015

(51) **Int. Cl.**
B65H 23/032 (2006.01)
B65H 23/02 (2006.01)

(52) **U.S. Cl.**
CPC ***B65H 23/032*** (2013.01); ***B65H 23/0204*** (2013.01); *B65H 2301/211* (2013.01); *B65H 2301/3611* (2013.01); *B65H 2301/3613* (2013.01); *B65H 2403/55* (2013.01); *B65H 2404/66* (2013.01); *B65H 2555/20* (2013.01); *B65H 2801/57* (2013.01)

(58) **Field of Classification Search**
CPC B65H 23/032; B65H 23/035; B65H 23/038; B65H 23/0204; B65H 2555/20; B65H 2403/55; B65H 2301/3611; B65H 2301/3613; B65H 2301/36132; B65H 2404/66
See application file for complete search history.

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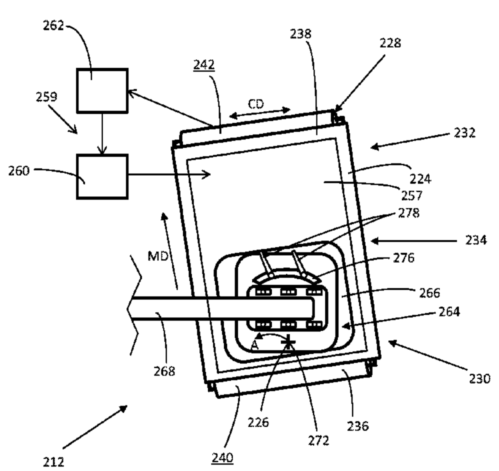
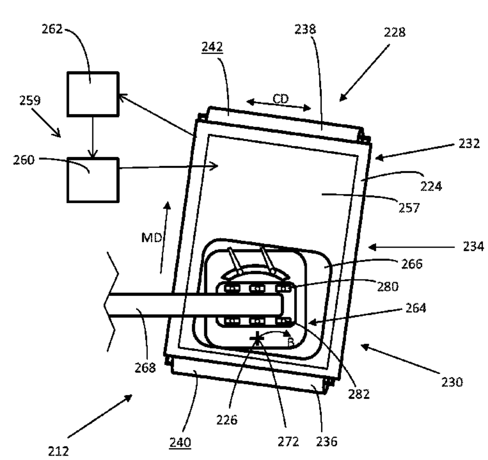
Primary Examiner — Michael McCullough
(74) *Attorney, Agent, or Firm* — Sarah M. DeCristofaro; Abbey A. Lopez

(57) **ABSTRACT**

An apparatus may be used to control the cross-directional movement of a web advancing in a machine direction. The web defines a machine direction centerline. The apparatus may include a frame rotatable about a first axis of rotation and a guide member connected with the frame and configured to receive an advancing web. The apparatus may include a first rotation member connected with the frame and configured to rotate the frame by a first angle of rotation about the first axis of rotation to align a machine direction centerline of the advancing web with a target cross-directional position. The apparatus comprises a second rotation member connected with the frame and configured to rotate the frame about a second axis of rotation by a second angle of rotation to adjust the target cross-directional position, wherein the second angle of rotation is greater than the first angle of rotation.

20 Claims, 19 Drawing Sheets





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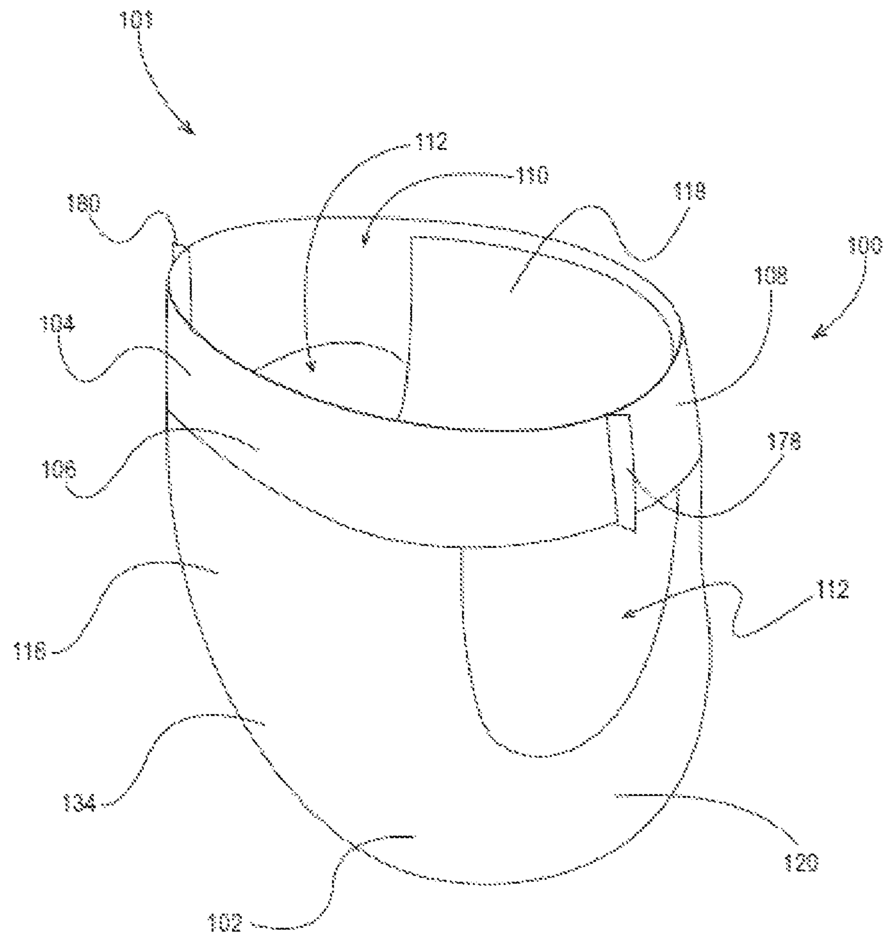

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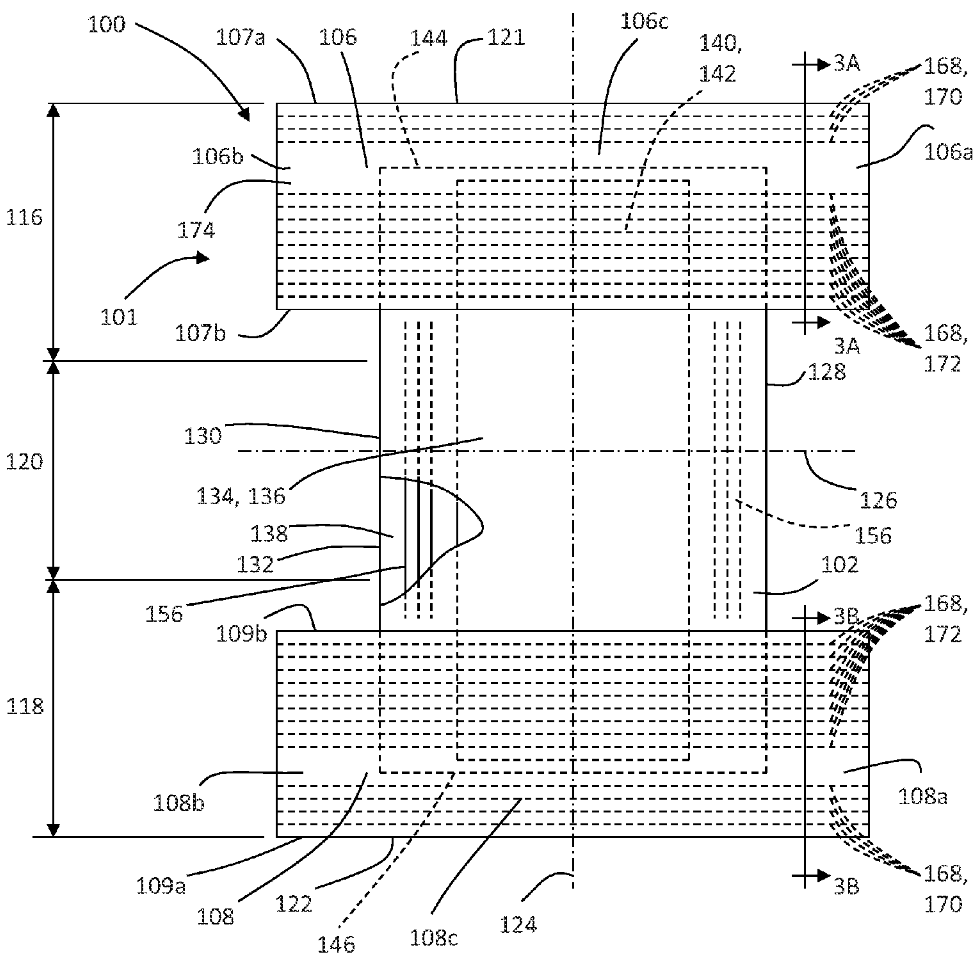
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FIG. 2A

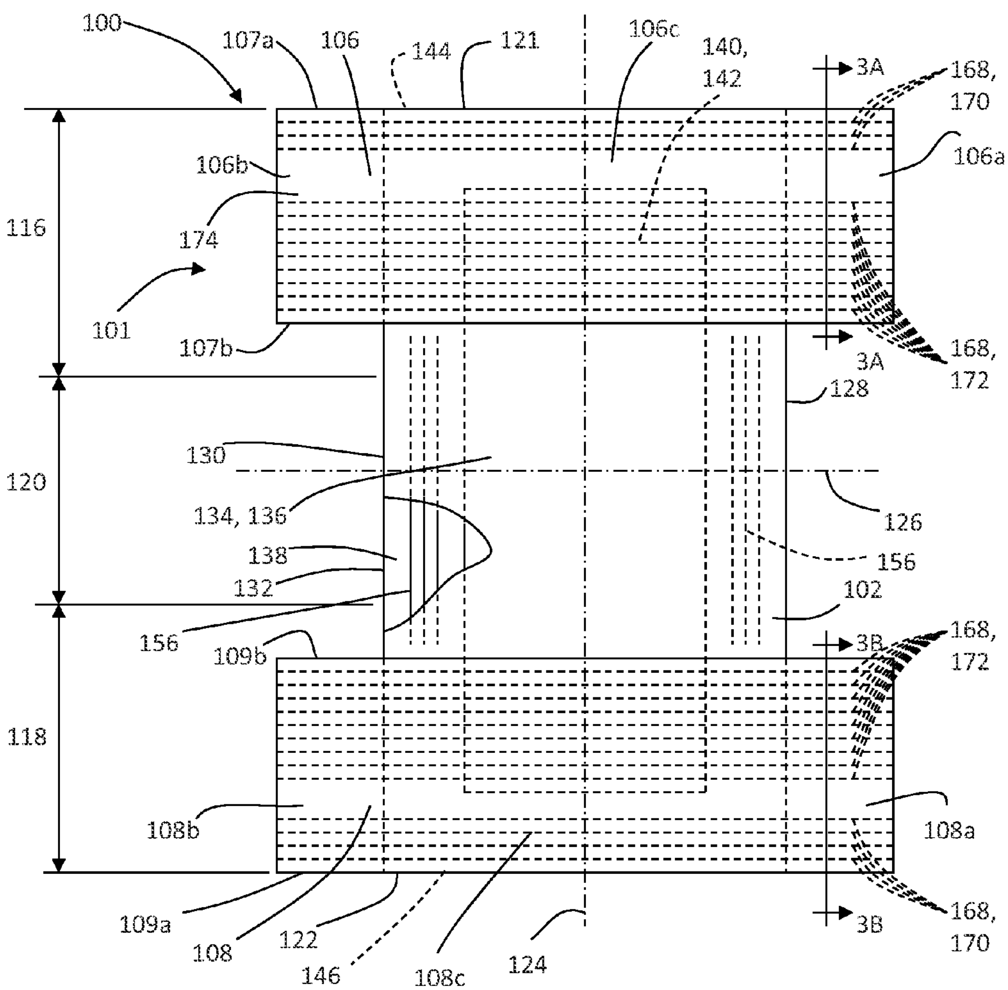
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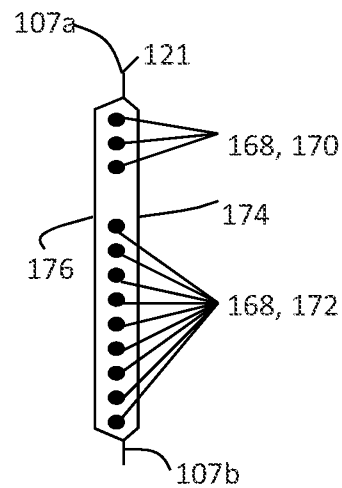
FIG. 2B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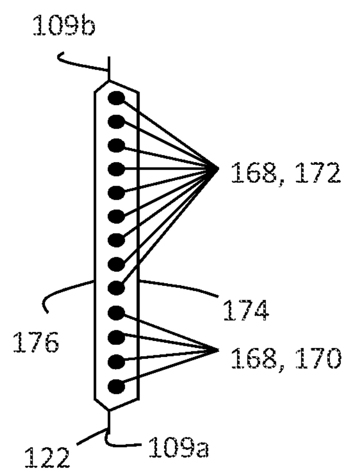
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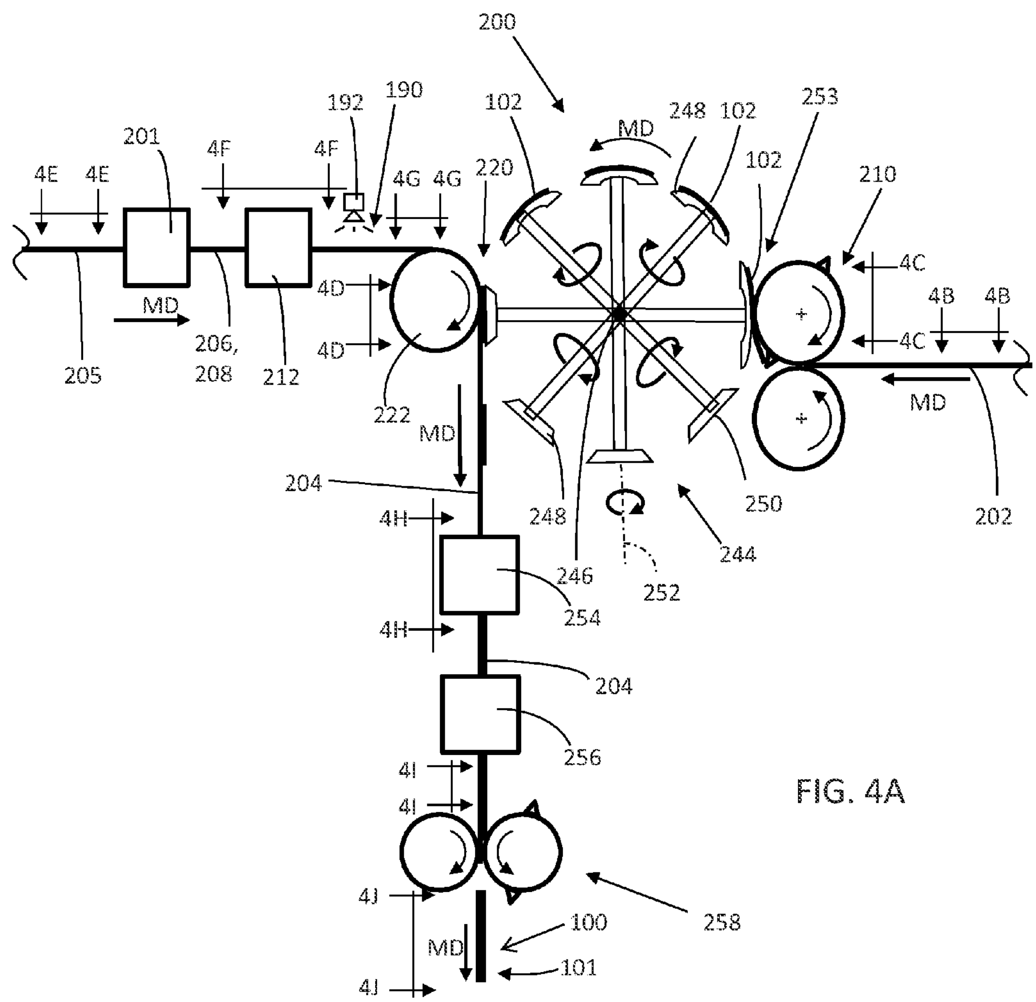
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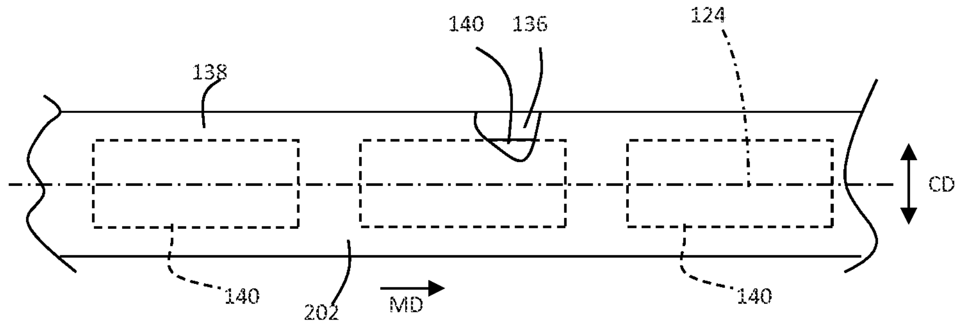
FIG. 4A



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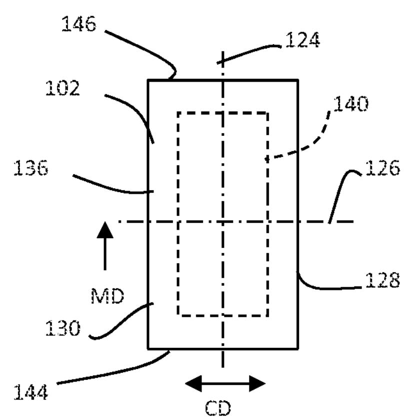

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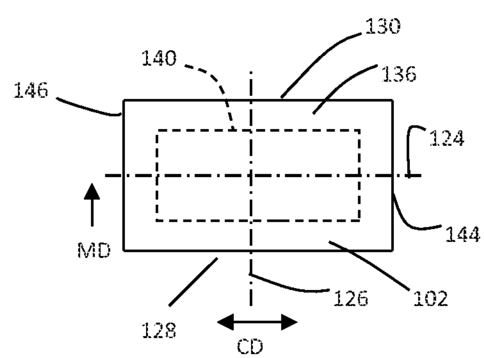

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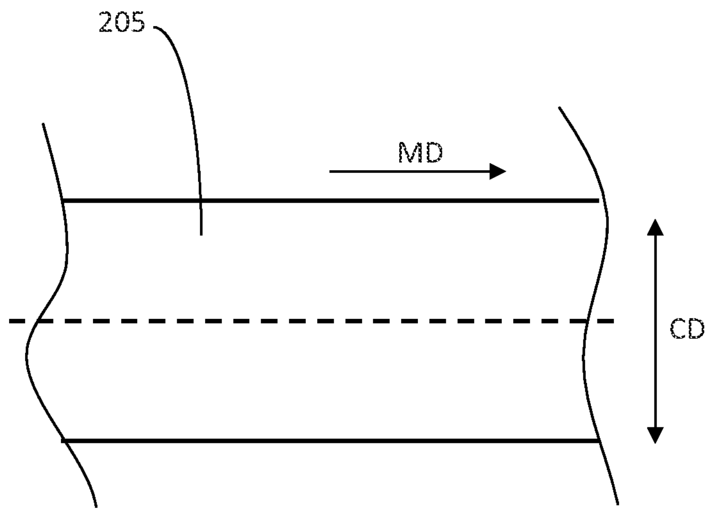

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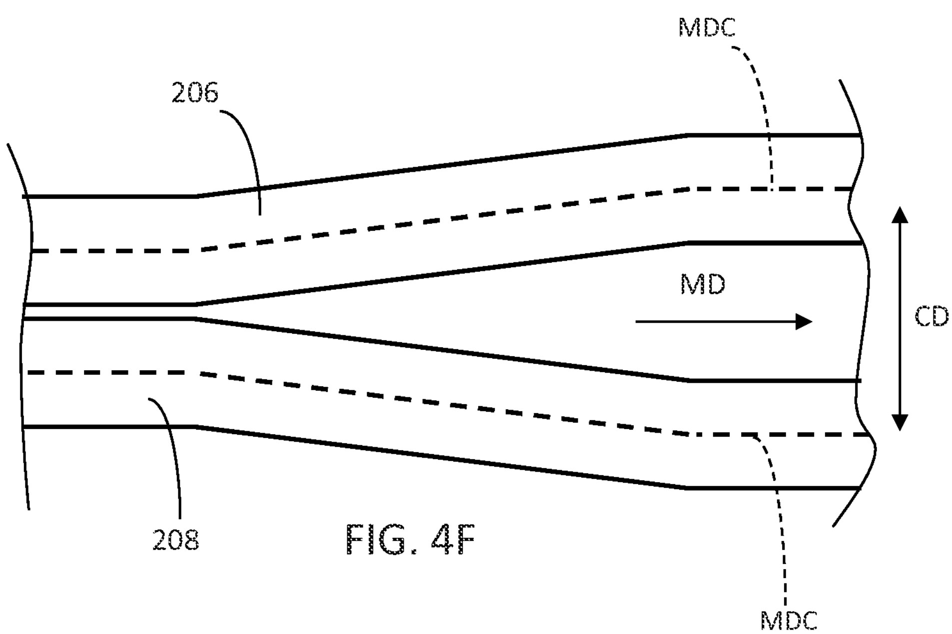

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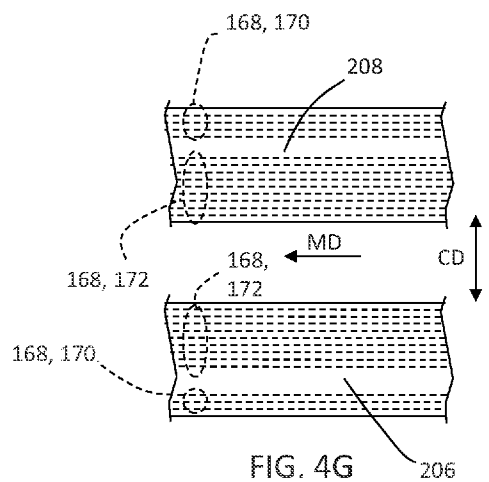
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FIG. 4G

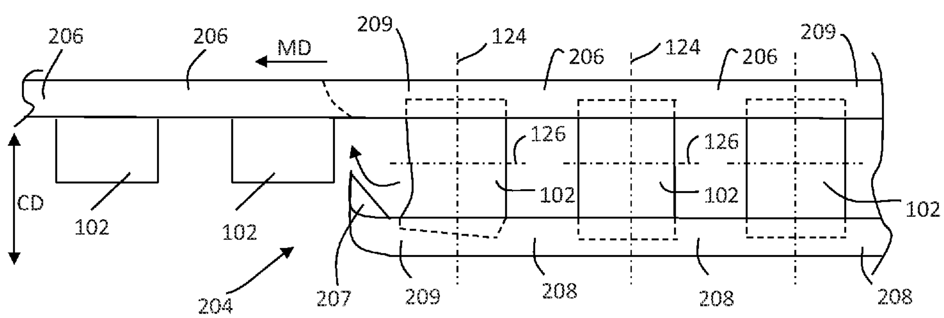
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FIG. 4H

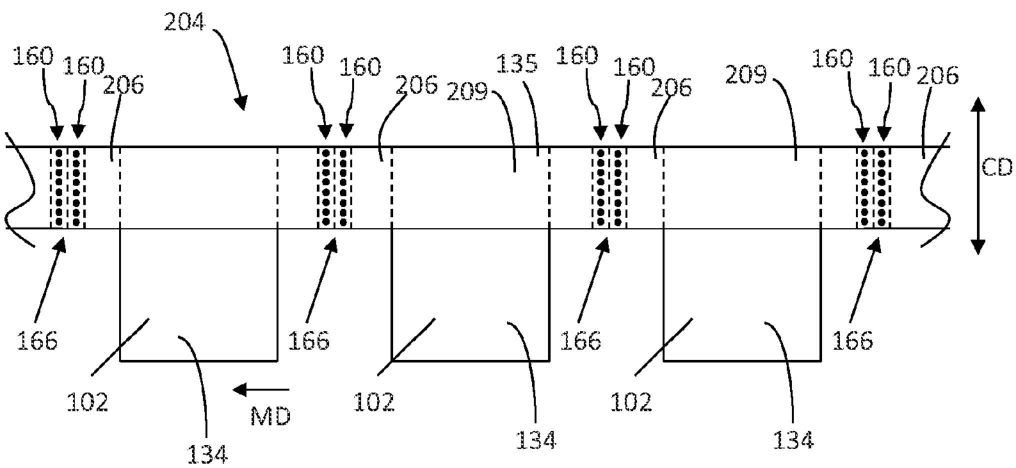
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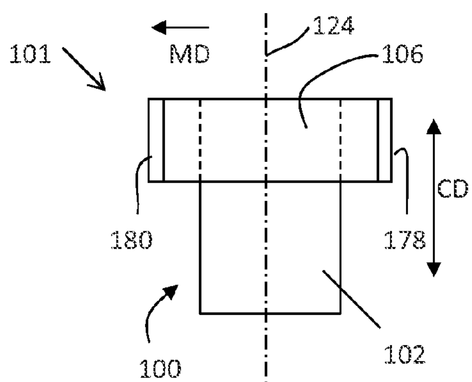
FIG. 4I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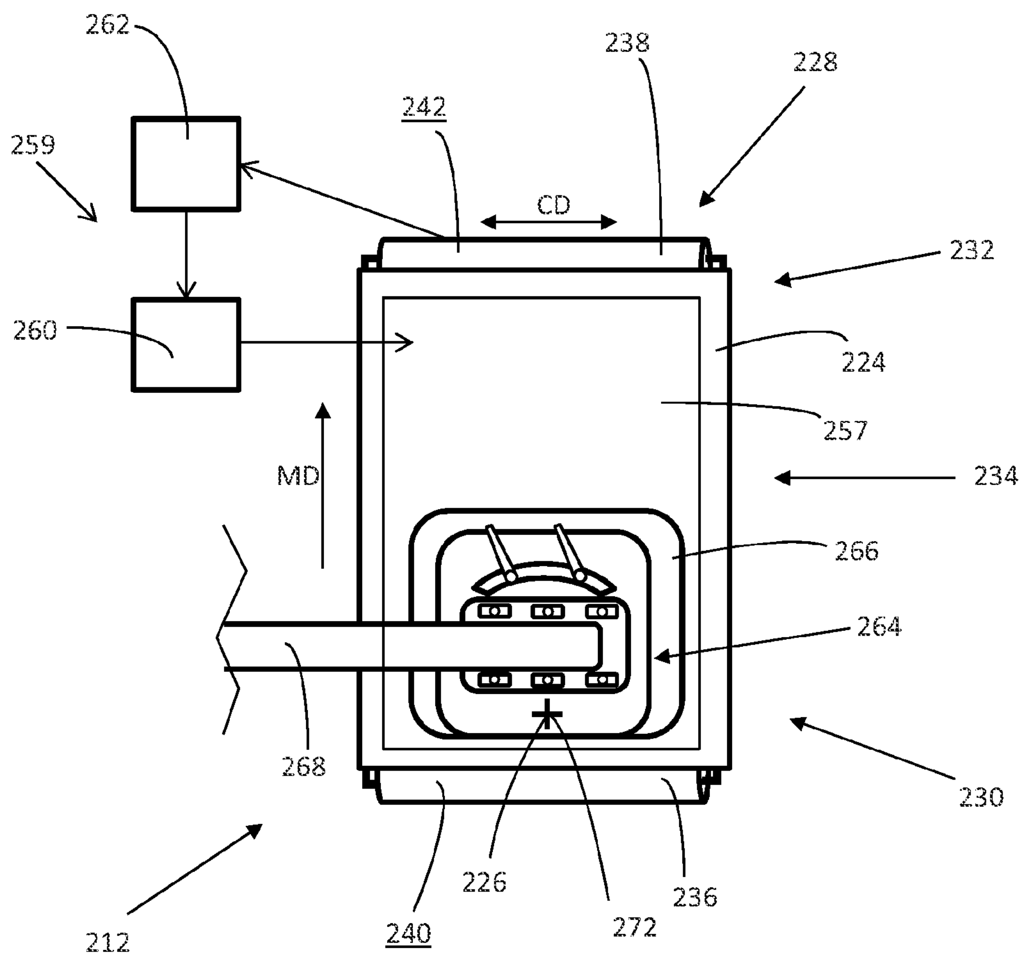
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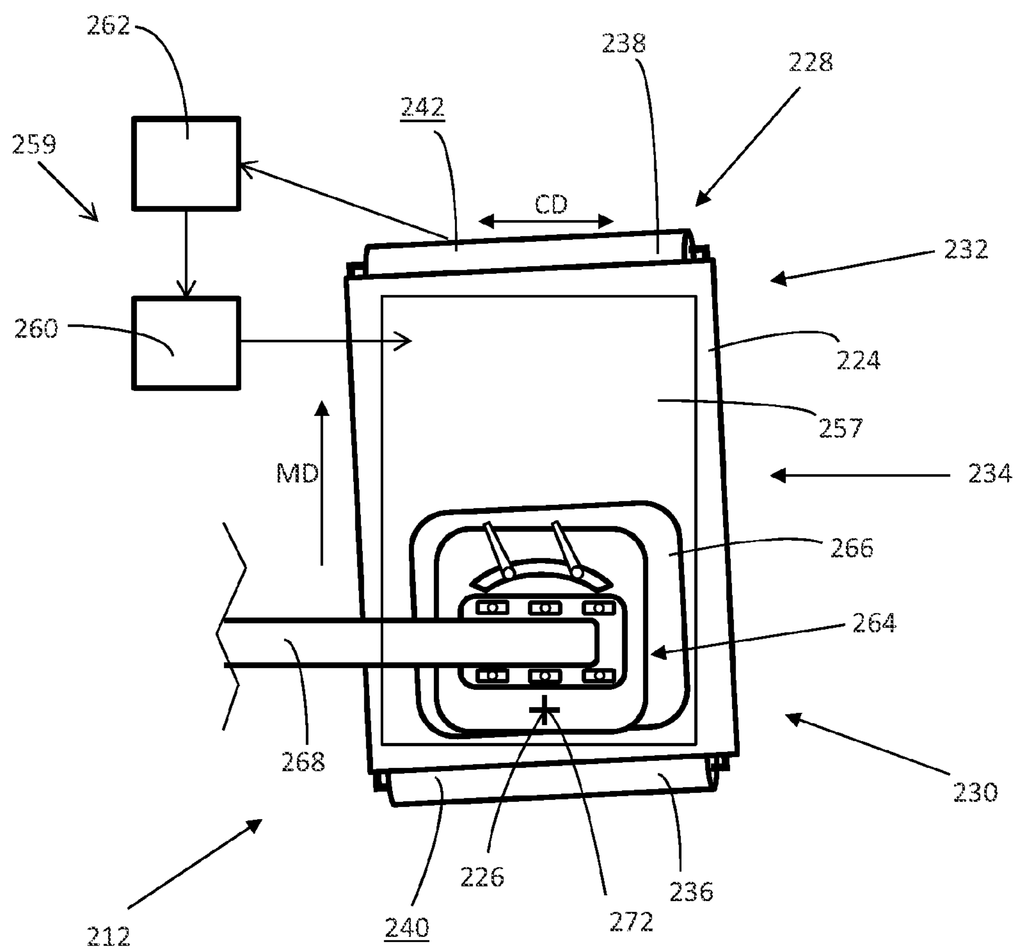
FIG. 5A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240

FIG. 5B

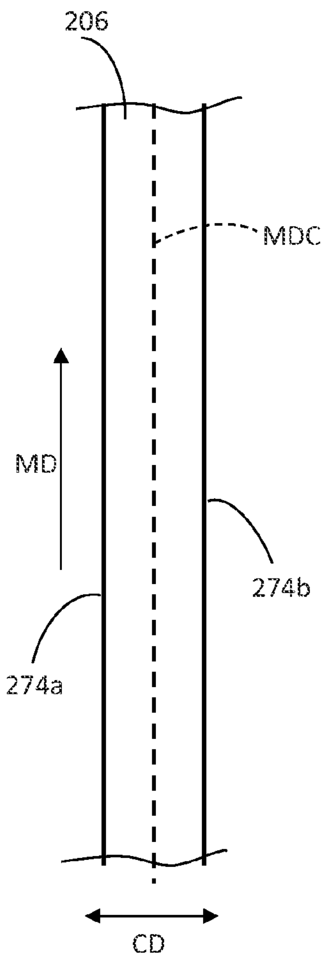


FIG. 6

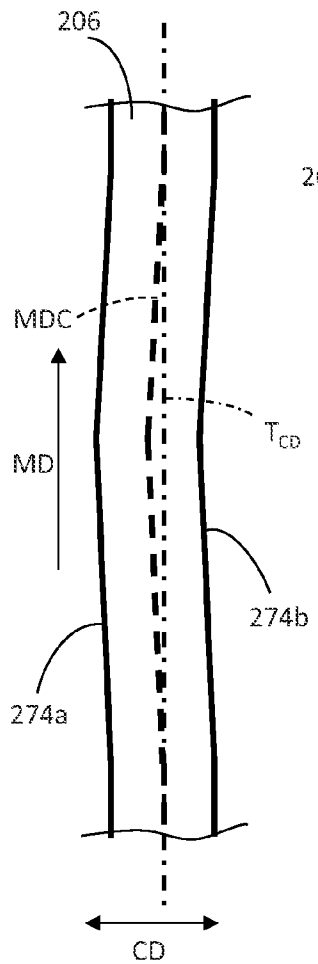


FIG. 7

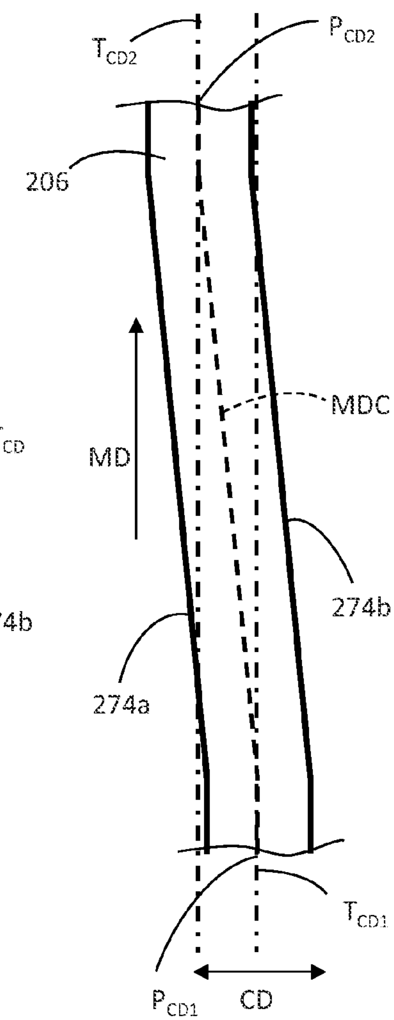


FIG. 8

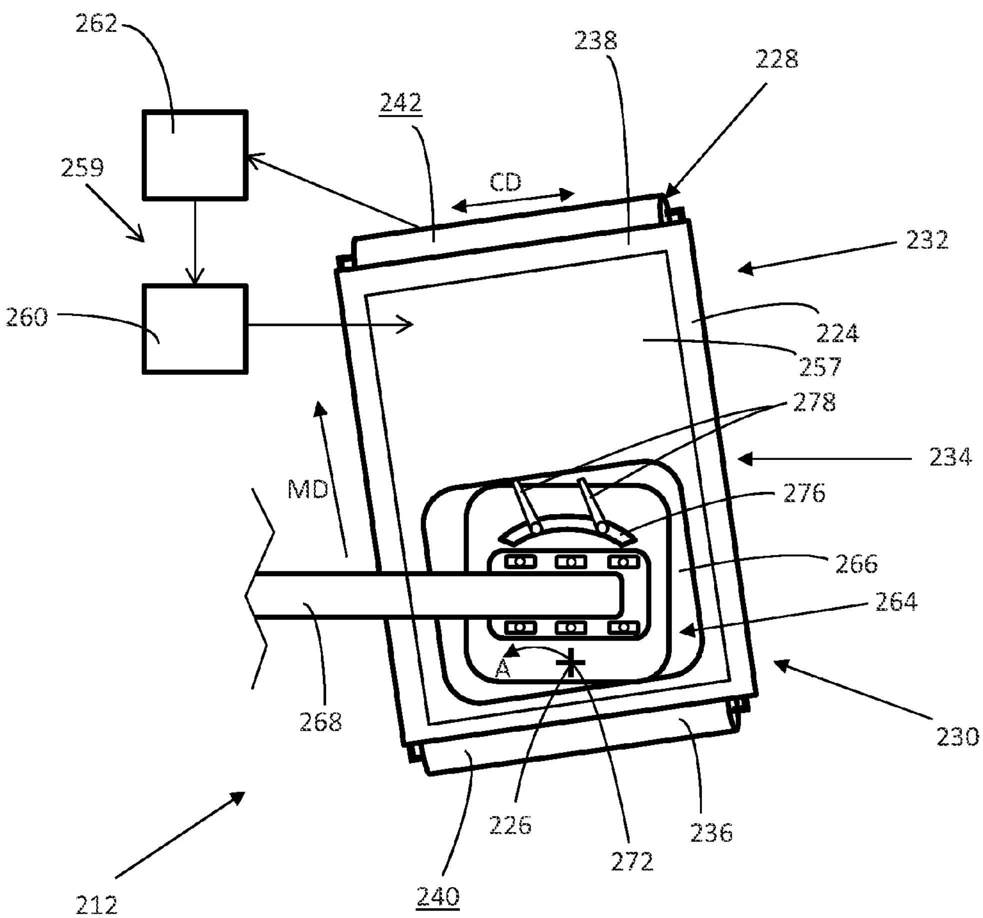

262
238
228
242
259
CD
232
260
224
257
278
234
MD
276
266
264
A
268
230
226
236
272
212
240

FIG. 9

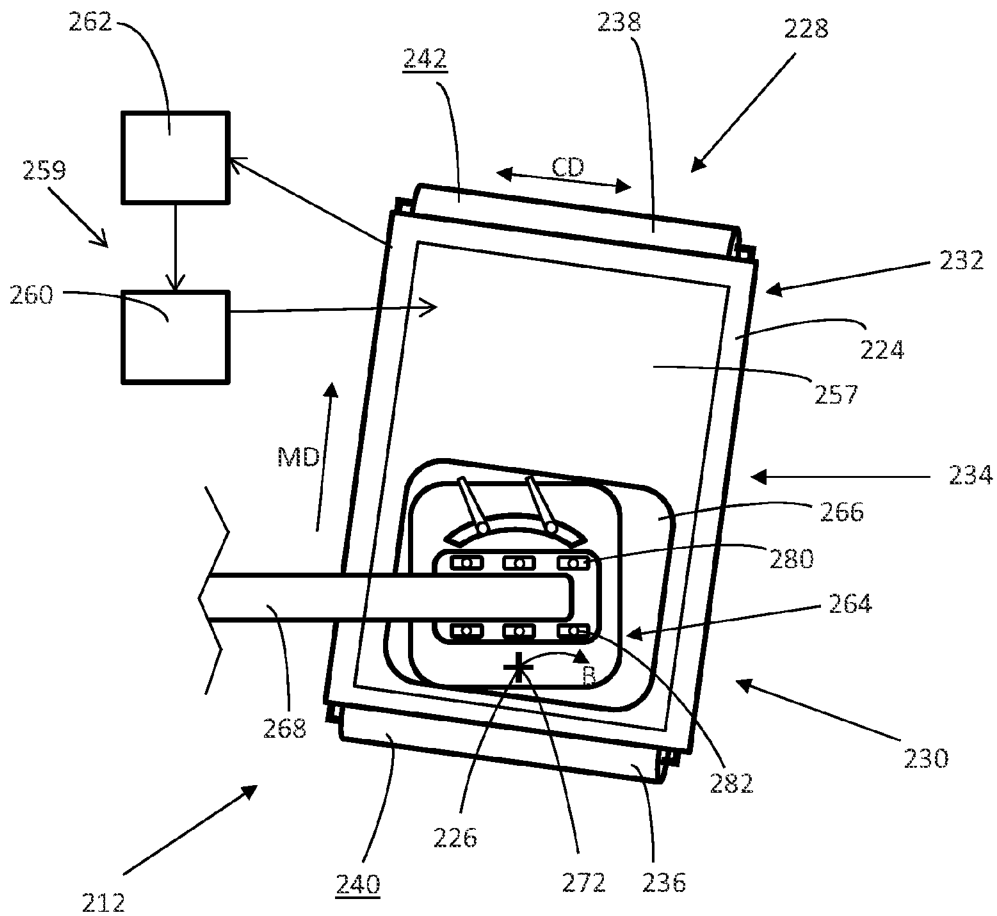
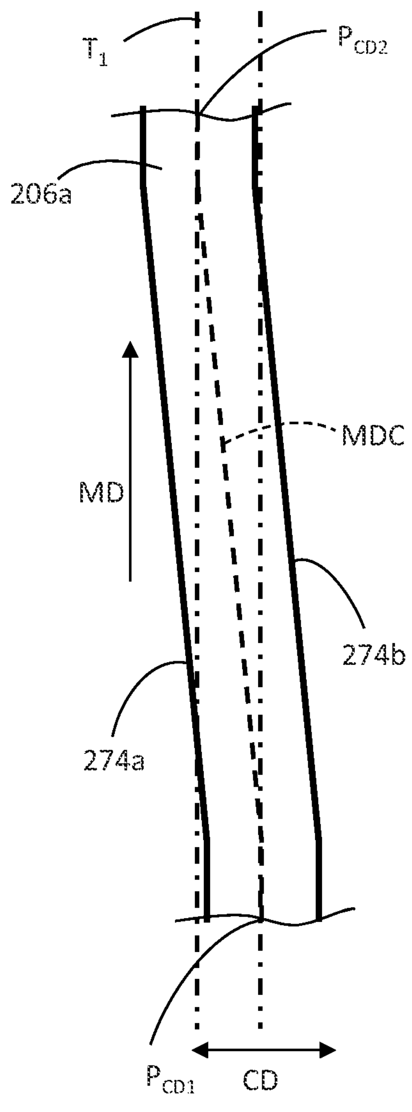
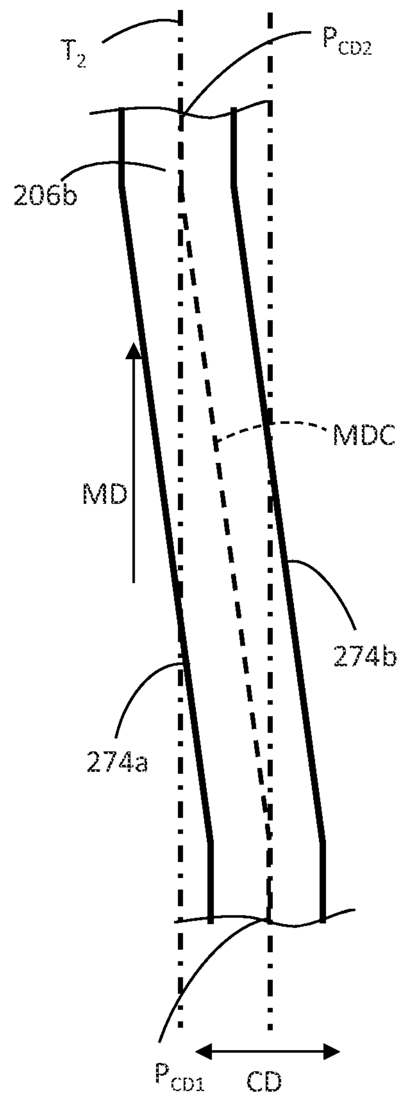

262
259
260
242
238
228
CD
232
224
257
MD
234
266
280
264
B
268
230
282
226
212
240
272
236

Fig. 10



T1
PCD2
206a
MD
MDC
274b
274a
PCD1
CD

FIG. 11



T2
PCD2
206b
MD
MDC
274b
274a
PCD1
CD

FIG. 12

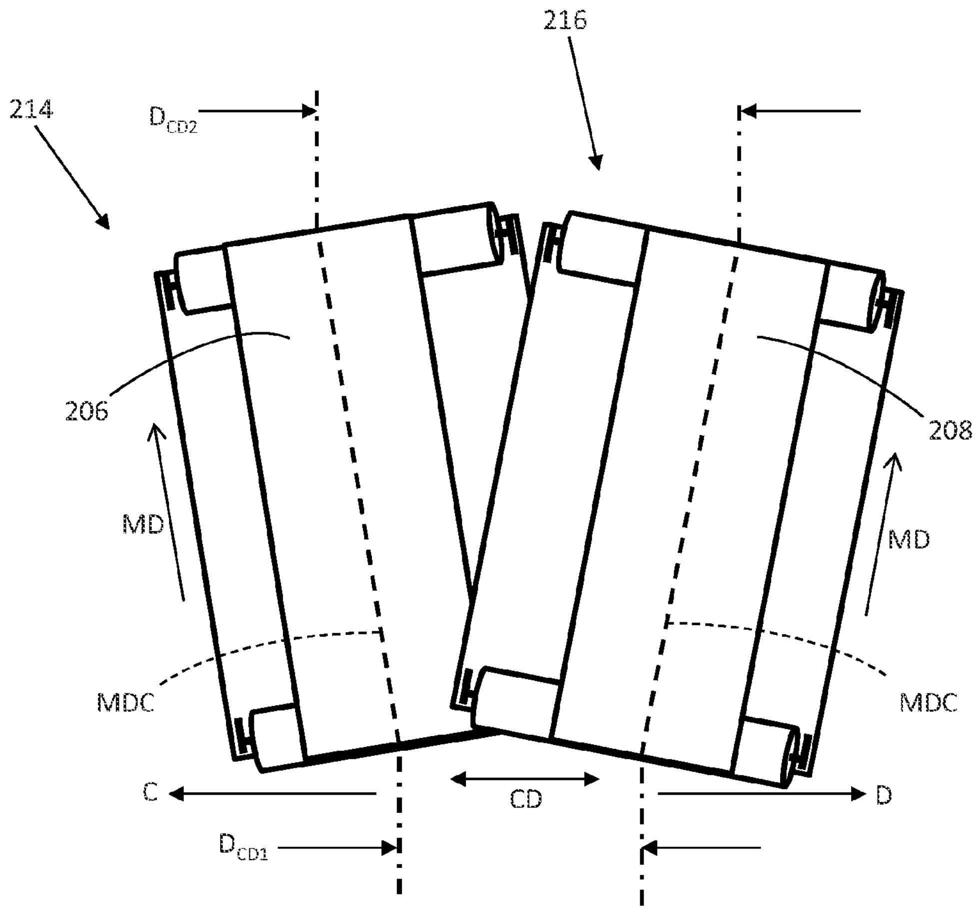


FIG. 13

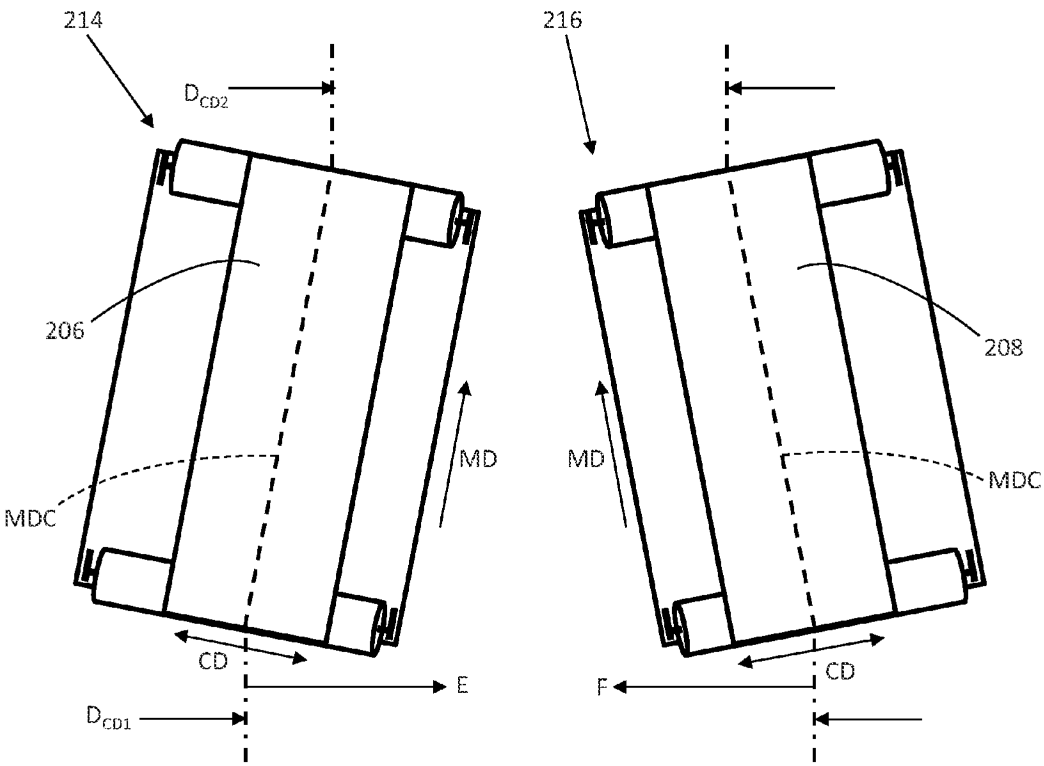


FIG. 14

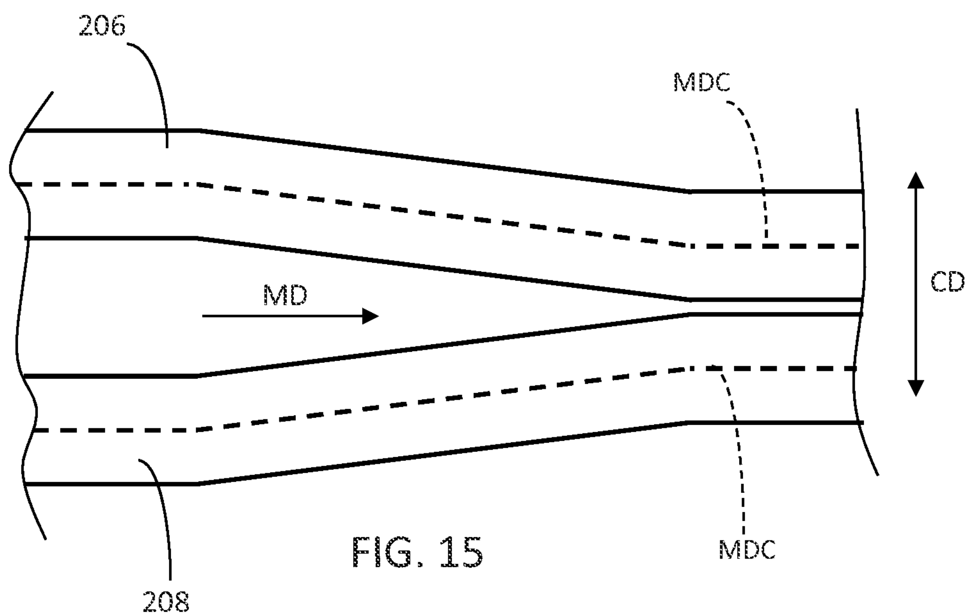


FIG. 15

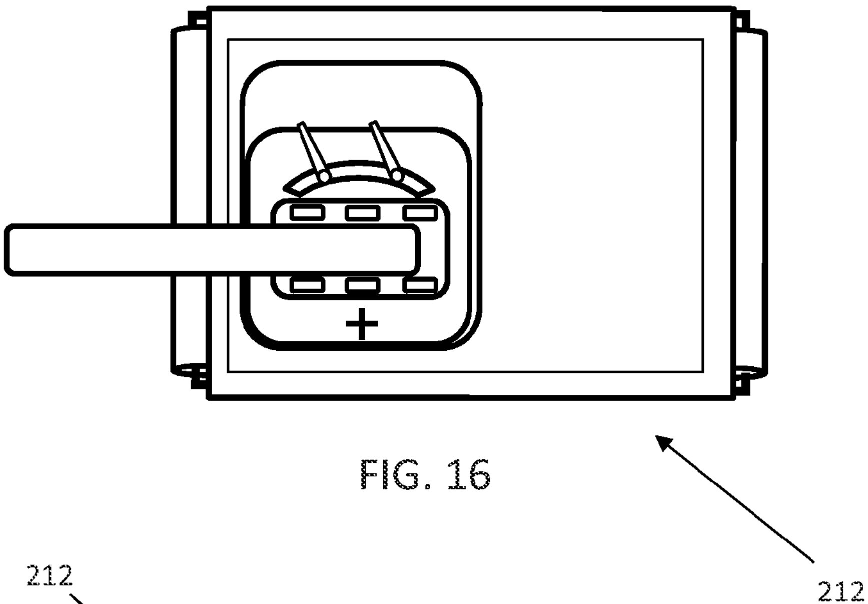


FIG. 16

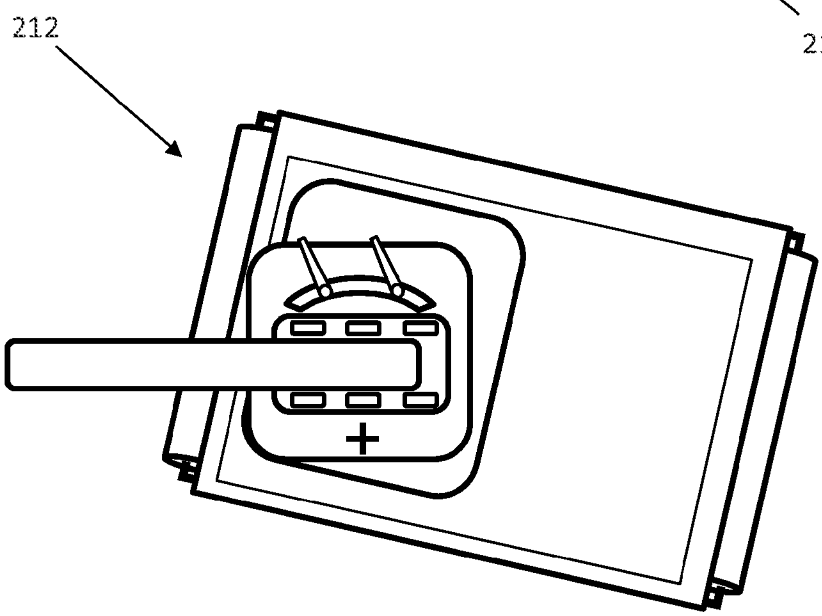


FIG. 17

APPARATUS FOR POSITIONING AN ADVANCING WEB

FIELD

The present disclosure generally relates to an apparatus for manufacturing absorbent articles, and, more particularly, relates to an apparatus for controlling the position of an advancing web.

BACKGROUND

Absorbent articles, such as taped diapers or pant diapers, for example, may be manufactured by a process where discrete articles, such as a chassis of a taped diaper or a pant diaper including a topsheet, a backsheet, and an absorbent core, for example, are applied to one or more moving webs of components, such as continuous webs of front and rear waistbands, for example. In some processes, a continuous length of waistband web advancing in a machine direction may be cut along the machine direction into front and rear waistband webs. Prior to joining the two continuous lengths of front and rear waistband webs with discrete chassis, the front and rear waistband webs may need to be spaced apart from each other in a cross direction. For producing different size absorbent articles, the front and rear waistband webs may need to be cross-directionally spaced apart by different amounts. That is, as the size of the absorbent article increases, the spacing between the front and rear waistband webs may increase.

Some manufacturing processes utilize a web spacing device to control the cross-directional position of an advancing web. For example, an advancing web may define a machine direction centerline that is equidistant from longitudinal side edges of the web. The web spacing device may maintain the machine direction centerline of the web in line with a target cross-directional position. Such a web spacing device may also be used to shift the web such that the machine direction centerline of the web is shifted in the cross direction. However, such a web spacing device may be incapable of shifting the front and rear waistband webs far enough apart in the cross direction in preparation for joining the front and rear waistband webs with the discrete chassis. Furthermore, such web spacing devices may be configured for manufacturing absorbent articles of a predetermined size. As a result, separate web spacing devices may be needed for cross-directionally spacing front and rear waistband webs for manufacturing different size absorbent articles.

Therefore, it would be beneficial to provide a web spacing device that is capable of cross-directionally shifting an advancing web by a relatively large degree. Moreover, it would be beneficial to provide a web spacing device that is capable of cross-directionally shifting an advancing web or webs for the production of absorbent articles of various sizes.

SUMMARY

Aspects of the present disclosure include an apparatus for controlling cross-directional movement of a web advancing in a machine direction. The web defines a machine direction centerline. The apparatus comprises a frame having a first end portion and a second end portion separated by a central portion, wherein the frame is rotatable about a first axis of rotation. The apparatus comprises first rotation member movably connected with the frame, wherein the first rotation

member is configured to rotate the frame by a first angle of rotation about the first axis of rotation. The apparatus further comprises a second rotation member movably connected with the frame, wherein the second rotation member is configured to rotate the frame about a second axis of rotation by a second angle of rotation. The second angle of rotation is greater than the first angle of rotation.

Aspects of the present disclosure include an apparatus comprising a frame having a first end portion and a second end portion separated by a central portion and a rotation member rotatably connected with the frame. The rotation member is configured to rotate the frame about an axis of rotation. The rotation member comprises a rotation aperture and a locking member, wherein the locking member is connected with the frame and associated with the rotation aperture. The locking member is positionable in various locations along the rotation aperture to adjust the orientation of the frame.

Aspects of the present disclosure include a method for controlling cross-directional movement of a web advancing in a machine direction using a web spacing device. The web spacing device comprises a frame having a first end portion and a second end portion separated by a central portion, wherein the frame is rotatable about a first axis of rotation. The web spacing device further comprises a first rotation member movably connected with the frame, wherein the first rotation member is configured to rotate the frame by a first angle of rotation about the first axis of rotation. The web spacing device further comprises a second rotation member movably connected with the frame, wherein the second rotation member is configured to rotate the frame about a second axis of rotation by a second angle of rotation. The second angle of rotation is greater than the first angle of rotation. The web defines a machine direction centerline. The method comprises the steps of: rotating the frame about the second axis of rotation using the second rotation member to position the web spacing device in a first configuration; advancing a first web in a machine direction onto the web spacing device; shifting the machine direction centerline of the first web in a cross direction; aligning the machine direction centerline of the first web with a first target cross-directional position; rotating the frame about the second axis of rotation using the second rotation member to position the web spacing device in a second configuration; advancing a second web in a machine direction onto the web spacing device; shifting the machine direction centerline of the second web in the cross direction; and aligning the machine direction centerline of the second web with a second target cross-directional position that is different from the first target cross-directional position.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a schematic, perspective view of a diaper pant.

FIG. **2**A is a partially cut-away, plan view of a diaper pant.

FIG. **2**B is a partially cut-away, plan view of a diaper pant.

FIG. **3**A is a cross-sectional view of the diaper pant of FIGS. **2**A and **2**B taken along line **3**A-**3**A.

FIG. **3**B is a cross-sectional view of the diaper pant of FIGS. **2**A and **2**B taken along line **3**B-**3**B.

FIG. **4**A is a schematic, side elevation view of a converting apparatus.

FIG. **4**B is a schematic, plan view of a continuous length of chassis assemblies of FIG. **4**A taken along lines **4**B-**4**B.

FIG. **4**C is a schematic, plan view of a discrete chassis having a longitudinal axis parallel with a machine direction of FIG. **4**A taken along line **4**C-**4**C.

FIG. 4D is a schematic, plan view of a discrete chassis having a lateral axis parallel with the machine direction of FIG. 4A taken along line 4D-4D.

FIG. 4E is a schematic, plan view of a continuous length of belt substrate of FIG. 4A taken along lines 4E-4E.

FIG. 4F is a schematic, plan view of continuous lengths of first and second belt substrate of FIG. 4A taken along lines 4F-4F.

FIG. 4G is a schematic, plan view of continuous lengths of first and second belt substrate of FIG. 4A taken along lines 4G-4G.

FIG. 4H is a schematic, plan view of a continuous length of diaper pants of FIG. 4A taken along line 4H-4H.

FIG. 4I is a schematic, plan view of a continuous length of folded diaper pants of FIG. 4A taken along line 4I-4I.

FIG. 4J is a schematic, plan view of a discrete diaper pant of FIG. 4A taken along line 4J-4J.

FIG. 5A is a schematic, front elevation view of a web spacing device in a substantially vertical orientation.

FIG. 5B is a schematic, front elevation view of a web spacing device with a frame rotated relative to a base of a first rotation member.

FIG. 6 is a schematic, plan view of a continuous web in the form of a first belt substrate.

FIG. 7 is a schematic, plan view of a continuous web in the form of a first belt substrate.

FIG. 8 is a schematic, plan view of a continuous web in the form of a first belt substrate that is shifted in a cross-direction.

FIG. 9 is a schematic, front elevation view of a web spacing device.

FIG. 10 is a schematic, front elevation view of a web spacing device.

FIG. 11 is a schematic, plan view of a first web in the form of a first belt substrate.

FIG. 12 is a schematic, plan view of a second web in the form of a first belt substrate.

FIG. 13 is a schematic, back elevation view of first and second web spacing devices.

FIG. 14 is a schematic, back elevation view of first and second web spacing devices.

FIG. 15 is a schematic, plan view of first and second continuous belt substrates.

FIG. 16 is a schematic, front elevation view of a web spacing device in a substantially horizontal orientation.

FIG. 17 is a schematic, front elevation view of a web spacing device.

DETAILED DESCRIPTION

Various non-limiting exemplary configurations of the present disclosure will now be described to provide an overall understanding of the principles of the structure, function, manufacture, and use of the apparatuses for transferring discrete articles disclosed herein. One or more examples of these non-limiting exemplary configurations are illustrated in the accompanying drawings. Those of ordinary skill in the art will understand that the apparatuses for transferring discrete articles described herein and illustrated in the accompanying drawings are non-limiting example configurations and that the scope of the various non-limiting configurations of the present disclosure are defined solely by the claims. The features illustrated or described in connection with one non-limiting exemplary configuration may be combined with the features of other non-limiting exemplary configurations. Such modifications and variations are intended to be included within the scope of the present disclosure.

The following definitions may be useful in understanding the present disclosure.

"Absorbent article" is used herein to refer to consumer products that primarily functions to absorb and retain soils and wastes. "Diaper" is used herein to refer to an absorbent article generally worn by infants and incontinent persons about the lower torso. The term "disposable" is used herein to describe absorbent articles which generally are not intended to be laundered or otherwise restored or reused as an absorbent article (for example, they are intended to be discarded after a single use and may also be configured to be recycled, composted or otherwise disposed of in an environmentally compatible manner).

"Longitudinal" means a direction running substantially perpendicular from a waist edge to a longitudinally opposing waist edge of an absorbent article when the article is in a flat out, uncontracted state, or from a waist edge to the bottom of the crotch, i.e. the fold line, in a bi-folded article. Directions within 45 degrees of the longitudinal direction are considered to be "longitudinal." "Lateral" refers to a direction running from a longitudinally extending side edge to a laterally opposing longitudinally extending side edge of an article and generally at a right angle to the longitudinal direction. Directions within 45 degrees of the lateral direction are considered to be "lateral."

"Substrate" is used herein to describe a material which is primarily two-dimensional (i.e. in an XY plane) and whose thickness (in a Z direction) is relatively small (i.e. 1/10 or less) in comparison to the substrate's length (in an X direction) and width (in a Y direction). Non-limiting examples of substrates include a web, layer or layers or fibrous materials, nonwovens, films and foils such as polymeric films or metallic foils. These materials may be used alone or may comprise two or more layers joined together. As such, a web is a substrate.

"Nonwoven" refers herein to a material made from continuous (long) filaments (fibers) and/or discontinuous (short) filaments (fibers) by processes such as spunbonding, meltblowing, carding, and the like. Nonwovens do not have a woven or knitted filament pattern.

"Machine direction" (MD) is used herein to refer to the direction of material flow through a process. In addition, relative placement and movement of material can be described as flowing in the machine direction through a process from upstream in the process to downstream in the process. "Cross direction" (CD) is used herein to refer to a direction that is not parallel with, and usually perpendicular to, the machine direction.

"Pant" (also referred to commercially as "training pant", "pre-closed diaper", "pant diaper", "diaper pant", and "pull-on diaper") refers herein to disposable absorbent articles having a continuous perimeter waist opening and continuous perimeter leg openings designed for infant or adult wearers. A pant can be configured with a continuous or closed waist opening and at least one continuous, closed, leg opening prior to the article being applied to the wearer. A pant can be preformed by various techniques including, but not limited to, joining together portions of the article using any refastenable and/or permanent closure member (for example, seams, heat bonds, pressure welds, adhesives, cohesive bonds, mechanical fasteners, etc.). A pant can be preformed anywhere along the circumference of the article in the waist region (for example, side fastened or seamed, front waist fastened or seamed, rear waist fastened or seamed).

Values disclosed herein as ends of ranges are not to be understood as being strictly limited to the exact numerical values recited. Instead, unless otherwise specified, each numerical range is intended to mean both the recited values, any integers within the specified range, and any ranges with the specified range. For example a range disclosed as "1 to 10" is intended to mean "1, 2, 3, 4, 5, 6, 7, 8, 9, 10."

The present disclosure includes an apparatus for controlling the cross-directional position of a continuous web advancing in a machine direction. The apparatus may be configured as a web spacing device. An advancing continuous web may define a machine direction centerline that is equidistant from longitudinal side edges of the continuous web. Sometimes, during operation, a continuous web advancing in the machine direction may undesirably shift in the cross direction as a result of various operating conditions. If the machine direction centerline of the web is positioned away from a target cross-directional position, components of the resulting absorbent articles may be misaligned. As such, the web spacing device of the present disclosure may control the cross-directional position of the continuous web by maintaining the machine direction centerline of the web at a target cross-directional position, or within a predetermined distance of the target cross-directional position.

Furthermore, the web spacing device of the present disclosure may be used to cross-directionally shift a continuous web advancing in the machine direction. As a result, not only does the web spacer device act to correct cross-directional movement of the web relative to the target cross-directional position, but the web spacing device may also act to change the cross-directional position of the advancing web or webs from a first target cross-directional position to a second target cross-directional position that is different from the first target cross-directional position.

The web spacing device may include a frame that is rotatable about a first axis of rotation. The frame may be associated with a first rotation member. The first rotation member may be configured to rotate the frame by a first angle of rotation about the first axis of rotation. The apparatus may comprise a second rotation member that is rotatably connected with the frame. The second rotation member may be configured to rotate the frame by a second angle of rotation about a second axis of rotation, wherein the second angle of rotation is greater than the first angle of rotation. In some exemplary configurations, the first axis of rotation and the second axis of rotation may be the same.

The apparatus may comprise a guide member having an outer surface, wherein the guide member is connected with the frame. The guide member may be in the form of first guide member and a second guide member. The first and second guide members each have an outer surface. The apparatus may be configured to control the cross-directional positioning of a web advancing in a machine direction. The outer surface of the first guide member may be configured to receive an advancing web. The outer surface of the second guide member may be configured to receive the advancing web advancing from the outer surface of the first guide member. The first rotation member may be configured to rotate the frame about the first axis of rotation to align the advancing web with a target cross-directional position. The second rotation member may be configured to rotate the frame about the second axis of rotation to adjust the target cross-directional position. By adjusting the target cross-directional position, an advancing web may advance onto the first guide member at a first cross-directional position and may advance onto the second guide member at a second cross-directional position that is different from the first cross-directional position.

In some exemplary configurations, the first rotation member may comprise a base associated with a motor, a sensor, and a closed-loop feedback control system to control movement of the frame about the first axis of rotation. The sensor of the first rotation member may be configured to sense the cross-directional position of the machine direction centerline of an advancing web. If the machine direction centerline of the advancing web is positioned away from the target cross-directional position, the sensor may communicate with the motor via the closed-loop feedback control system of the first rotation member. In turn, the motor may rotate the frame about the first axis of rotation to align the machine direction centerline of the advancing web with the target cross-directional position.

The apparatus may further comprise a support member connected with the second rotation member. The second rotation member may be adjustably connectable with the support member in various cross-directional positions. By adjusting the position of the second rotation member relative to the support member, the target cross-directional position of the advancing web may be adjusted.

The web spacing device may be used to space to cross-directionally shift two webs by different degrees. For example, to shift a first web advancing in the machine direction, the web spacing device may be positioned in a first configuration by rotating the frame about the second axis of rotation using the second rotation member. The first web may advance in the machine direction onto the web spacing device in the first configuration. The web spacing device may shift the machine direction centerline of the first web in the cross direction and align the machine direction centerline of the first web with a first target cross-directional position. Then, to shift a second web advancing in the machine direction, the web spacing device may be positioned in a second configuration by rotating the frame about the second axis of rotation using the second rotation member. The second web may advance in the machine direction onto the web spacing device. The web spacing device may shift the machine direction centerline of the second web in the cross direction and align the machine direction centerline of the second web with a second target cross-directional position that is different from the first target cross-directional position.

In some exemplary configurations, the apparatus may comprise a first web spacing device and a second web spacing device. The first web spacing device may be configured to cross-directionally position a first web advancing in the machine direction; likewise, the second web spacing device may be configured to cross-directionally position a second web advancing in the machine direction. The first and second advancing webs may be cut from a single continuous web advancing in the machine direction. The first and second web spacing devices may operate to cross-directionally shift two webs advancing in the machine direction in opposite directions. For example, the first web spacing device may reposition the first web cross-directionally away from the second web and the second web spacing device may reposition the second web cross-directionally away from the first web.

While the apparatus and method of the present disclosure may be used to cross-directionally position a waistband web for an adsorbent article, it is to be appreciated that the methods and apparatuses of the present disclosure may also be suitable for any other uses that require positioning an advancing web or discrete components of an advancing web. These other uses may comprise various manufacturing processes for any product, or intermediate product, in any industry.

As discussed above, the apparatuses disclosed herein may be used to cross-directionally reposition a continuous belt substrate or substrates advancing in a machine direction. To help provide additional context to the subsequent discussion, the following provides a general description of absorbent articles in the form of diapers that include webs, or components of webs, that may be positioned in accordance with the apparatuses and methods disclosed herein.

FIGS. **1**, **2**A, and **2**B show an exemplary absorbent article **100** in the form of a diaper pant **101** that may be formed in accordance with the apparatuses and methods disclosed herein. In particular, FIG. **1** shows a perspective view of a diaper pant **101** in a pre-fastened configuration and FIGS. **2**A and **2**B show plan views of the diaper pant **101** with the portion of the diaper pant **101** that faces away from a wearer oriented toward the viewer. The diaper pant **101** shown in FIG. **1** includes a chassis **102** and a ring-like elastic belt **104**. As discussed below in more detail, a first elastic belt **106** and a second elastic belt **108** are connected together to form the ring-like elastic belt **104**.

With continued reference to FIG. **2**A, the chassis **102** includes a first waist region **116**, a second waist region **118**, and a crotch region **120** disposed intermediate the first and second waist regions **116** and **118**. The first waist region **116** may be configured as a front waist region, and the second waist region **118** may be configured as back waist region. In some embodiments, the length of each of the front waist region **116**, back waist region **118**, and crotch region **120** may be one-third of the length of the absorbent article **100**. The diaper pant **101** may also include a laterally extending front waist edge **121** in the front waist region **116** and a longitudinally opposing and laterally extending back waist edge **122** in the back waist region **118**. To provide a frame of reference for the present discussion, the diaper **101** and chassis **102** of FIG. **2**A are shown with a longitudinal axis **124** and a lateral axis **126**. In some embodiments, the longitudinal axis **124** may extend through the front waist edge **121** and through the back waist edge **122**. The lateral axis **126** may extend through a first longitudinal or right side edge **128** and through a midpoint of a second longitudinal or left side edge **130** of the chassis **102**.

As shown in FIGS. **1** and **2**A, the diaper pant **101**, including the chassis **102** and the first and second belts **106**, **108** may include an inner, body facing surface **132**, and an outer, garment facing surface **134**. The chassis **102** may include a backsheet **136** and a topsheet **138**. The chassis **102** may also include an absorbent assembly **140**, including an absorbent core **142**, disposed between a portion of the topsheet **138** and the backsheet **136**. As discussed in more detail below, the diaper pant **101** may also include other features, such as leg elastics and/or leg cuffs to enhance the fit around the legs of the wearer.

As shown in FIG. **2**A, the periphery of the chassis **102** may be defined by the first longitudinal side edge **128**, a second longitudinal side edge **130**, a first laterally extending end edge **144** disposed in the first waist region **116**, and a second laterally extending end edge **146** disposed in the second waist region **118**. Both side edges **128** and **130** extend longitudinally between the first end edge **144** and the second end edge **146**. As shown in FIG. **2**A, the laterally extending end edges **144** and **146** are located longitudinally inward from the laterally extending front waist edge **121** in the front waist region **116** and the laterally extending back waist edge **122** in the back waist region **118**. When the diaper pant **101** is worn on the lower torso of a wearer, the front waist edge **121** and the back waist edge **122** of the diaper pant **101** may encircle a portion of the waist of the wearer. At the same time, the chassis side edges **128** and **130** may encircle at least a portion of the legs of the wearer. And the crotch region **120** may be generally positioned between the legs of the wearer with the absorbent core **142** extending from the front waist region **116** through the crotch region **120** to the back waist region **118**.

Referring to FIG. **2**A, the diaper pant **101** may also include elasticized leg cuffs **156**. It is to be appreciated that the leg cuffs **156** can be and are sometimes also referred to as leg bands, side flaps, barrier cuffs, elastic cuffs or gasketing cuffs. The elasticized leg cuffs **156** may be configured in various ways to help reduce the leakage of body exudates in the leg regions.

Diaper pants may be manufactured with a ring-like elastic belt **104** and provided to consumers in a configuration wherein the front waist region **116** and the back waist region **118** are connected to each other as packaged, prior to being applied to the wearer. As such, diaper pants **101** may have a continuous perimeter waist opening **110** and continuous perimeter leg openings **112** such as shown in FIG. **1**. The ring-like elastic belt **104** is defined by a first elastic belt **106** connected with a second elastic belt **108**. As shown in FIG. **2**A, the first elastic belt **106** defines first and second opposing end regions **106***a*, **106***b* and a central region **106***c*, and the second elastic **108** belt defines first and second opposing end regions **108***a*, **108***b* and a central region **108***c*. The central region **106***c* of the first elastic belt **106** is connected with the first waist region **116** of the chassis **102**, and the central region **108***c* of the second elastic belt **108** is connected with the second waist region **118** of the chassis **102**. With reference to FIGS. **1** and **2**A, the first end region **106***a* of the first elastic belt **106** is connected with the first end region **108***a* of the second elastic belt **108** at first side seam **178**, and the second end region **106***b* of the first elastic belt **106** is connected with the second end region **108***b* of the second elastic belt **108** at second side seam **180** to define the ring-like elastic belt **104** as well as the waist opening **110** and leg openings **112**.

Referring to FIGS. **2**A, **3**A, and **3**B, the first elastic belt **106** also defines an outer lateral edge **107***a* and an inner lateral edge **107***b*, and the second elastic belt **108** defines an outer lateral edge **109***a* and an inner lateral edge **109***b*. The outer lateral edges **107***a*, **109***a* may also define the front waist edge **121** and the laterally extending back waist edge **122**. The first elastic belt **106** and the second elastic belt **108** may also each include an outer, garment facing layer **174** and an inner, wearer facing layer **176**. It is to be appreciated that the first elastic belt **106** and the second elastic belt **108** may comprise the same materials and/or may have the same structure. In some embodiments, the first elastic belt **106** and the second elastic belt may comprise different materials and/or may have different structures. It should also be appreciated that the first elastic belt **106** and the second elastic belt **108** may be constructed from various materials. For example, the s may be manufactured from materials such as plastic films; apertured plastic films; woven or nonwoven webs of natural materials (e.g., wood or cotton fibers), synthetic fibers (e.g., polyolefins, polyamides, polyester, polyethylene, or polypropylene fibers) or a combination of natural and/or synthetic fibers; or coated woven or nonwoven webs. In some embodiments, the first and second belts include a nonwoven web of synthetic fibers, and may include a stretchable nonwoven. In other embodiments, the first and second belts include an inner hydrophobic, non-stretchable nonwoven material and an outer hydrophobic, non-stretchable nonwoven material.

The first and second belts **106**, **108** may also each include belt elastic material interposed between the outer layer **174** and the inner layer **176**. The belt elastic material may include one or more elastic elements such as strands, ribbons, or panels extending along the lengths of the elastic belts. As shown in FIGS. **2**A, **3**A, and **3**B, the belt elastic material may include a plurality of elastic strands **168**, which may be referred to herein as outer, waist elastics **170** and inner, waist elastics **172**. As shown in FIG. **2**A, the elastic strands **168** continuously extend laterally between the first and second opposing end regions **106***a*, **106***b* of the first elastic belt **106** and between the first and second opposing end regions **108***a*, **108***b* of the second elastic belt **108**. In some embodiments, some elastic strands **168** may be configured with discontinuities in areas, such as for example, where the first and second belts **106**, **108** overlap the absorbent assembly **140**. In some embodiments, the elastic strands **168** may be disposed at a constant interval in the longitudinal direction. In other embodiments, the elastic strands **168** may be disposed at different intervals in the longitudinal direction. The belt elastic material in a stretched condition may be interposed and joined between the uncontracted outer layer **174** and the uncontracted inner layer **176**. When the belt elastic material is relaxed, the belt elastic material returns to an unstretched condition and contracts the outer layer **174** and the inner layer **176**. The belt elastic material may provide a desired variation of contraction force in the area of the ring-like elastic belt.

It is to be appreciated that the chassis **102** and elastic belts **106**, **108** may be configured in different ways other than as depicted in FIG. **2**A. For example, FIG. **2**B shows a plan view of a diaper pant **101** having the same components as described above with reference to FIG. **2**A, except the first laterally extending end edge **144** of the chassis **102** is aligned along and coincides with the outer lateral edge **107***a* of the first elastic belt **106**, and the second laterally extending end edge **146** is aligned along and coincides with the outer lateral edge **109***a* of the second belt **108**.

Components of the disposable absorbent article (i.e., diaper, disposable pant, adult incontinence article, sanitary napkin, pantiliner, etc.) described in this specification can at least partially be comprised of bio-sourced content as described in US 2007/0219521A1 Hird et al published on Sep. 20, 2007, US 2011/0139658A1 Hird et al published on Jun. 16, 2011, US 2011/0139657A1 Hird et al published on Jun. 16, 2011, US 2011/0152812A1 Hird et al published on Jun. 23, 2011, US 2011/0139662A1 Hird et al published on Jun. 16, 2011, and US 2011/0139659A1 Hird et al published on Jun. 16, 2011. These components include, but are not limited to, topsheet nonwovens, backsheet films, backsheet nonwovens, side panel nonwovens, barrier leg cuff nonwovens, super absorbent, nonwoven acquisition layers, core wrap nonwovens, adhesives, fastener hooks, and fastener landing zone nonwovens and film bases.

In at least one embodiment, a disposable absorbent article component comprises a bio-based content value from about 10% to about 100% using ASTM D6866-10, method B, in another embodiment, from about 25% to about 75%, and in yet another embodiment, from about 50% to about 60% using ASTM D6866-10, method B.

In order to apply the methodology of ASTM D6866-10 to determine the bio-based content of any disposable absorbent article component, a representative sample of the disposable absorbent article component must be obtained for testing. In at least one embodiment, the disposable absorbent article component can be ground into particulates less than about 20 mesh using known grinding methods (e.g., Wiley® mill), and a representative sample of suitable mass taken from the randomly mixed particles.

As previously discussed, the apparatuses and methods of the present disclosure may be used to assemble various components in the manufacture of absorbent articles. For example, FIG. **4**A shows a schematic view of a converting apparatus adapted to manufacture diaper pants. The method of operation of the converting apparatus may be described with reference to the various components of the diaper pant **101** described above and shown in FIGS. **1**, **2**A, and **2**B. Although the following methods are provided in the context of the diaper pants shown in FIGS. **1**, **2**A, and **2**B, it is to be appreciated that various types of absorbent articles can be manufactured according the apparatuses and methods disclosed herein, such as for example, the absorbent articles disclosed in U.S. Pat. No. 7,569,039; U.S. Patent Publication No. 2005/0107764; U.S. Patent Application No. 2012/0061016; and U.S. Patent Publication No. 2012/0061015.

With reference to FIG. **4**A, and as discussed in more detail below, in operation, a converting apparatus **200** advances a continuous length of chassis assemblies **202** along a machine direction MD such that the longitudinal axis is parallel with the machine direction MD. The continuous length of chassis assemblies **202** are cut into discrete chassis **102**. The discrete chassis **102** are then rotated and advanced in the machine direction MD such that the lateral axis is parallel with the machine direction MD. The discrete chassis **102** are combined with continuous lengths of advancing substrates **206**, **208**. The discrete chassis **102** are then folded along the lateral axis to bring the belt substrates **206**, **208** into a facing relationship. The belt substrates **206**, **208** are then bonded together to form bonded regions. The belt substrates **206**, **208** are then cut along the bonded regions to create discrete diaper pants **101**.

As shown in FIGS. **4**A and **4**B, a continuous length of chassis assemblies **202** are advanced in a machine direction MD to a cutting device **210** where the continuous length of chassis assemblies **202** is cut into discrete chassis **102**. The continuous length of chassis assemblies **202** may include absorbent assemblies **140** sandwiched between topsheet material **138** and backsheet material **136**, leg elastics, barrier leg cuffs and the like. A portion of the chassis assembly shown in FIG. **4**B is cut-away to show a portion of the backsheet material **136** and an absorbent assembly **140**.

After the discrete chassis **102** are cut by the cutting device **210**, each chassis **102** are advanced onto a transfer assembly **244**. The transfer assembly **244** may include a transfer member **248** having an outer surface **250** on the distal most portion thereof relative to a rotation axis **246**. The transfer assembly **244** may rotate about an axis of rotation **246** and the transfer member **248** may rotate about an axis of rotation **252**. The outer surface **250** of each transfer member **248** may be flat, or substantially flat, in one or more directions. For example, as shown in FIG. **4**A, the outer surface **250** may be flat or substantially flat in one direction, and may be curved in another direction. Substantially flat, as used herein, means the outer surface **250** used to support and transport a discrete article **102** conforms to a plane within about 0-10 mm, and alternatively about 0-5 mm.

The chassis **102** may advance from the cutting device **210** through a nip **253** between the cutting device **210** and the transfer assembly **244** in the orientation shown in FIG. **4**C, wherein the longitudinal axis **124** of the chassis **102** is generally parallel with the machine direction MD. The transfer assembly **244** may rotate about the axis of rotation **246** to advance the discrete chassis **102** in the machine direction MD with the second laterally extending end edge **146** as a leading edge and the first laterally extending end edge **144** as the trailing edge. However, it is to be appreciated that in other exemplary configurations, the chassis **102** may be advanced in other orientations. For example, the chassis **102** may be oriented such that the second laterally extending end edge **146** is a trailing edge and the first laterally extending end edge **144** is a leading edge.

As the transfer assembly **244** advances the discrete chassis **102** in the machine direction MD, the transfer member **248** also rotates the chassis **102** about the axis of rotation **252** to change the orientation of the advancing chassis **102**. For example, the transfer member **248** may rotate the chassis from the orientation shown in FIG. **4**C to the orientation shown in FIG. **4**D, wherein the lateral axis **126** of the chassis **102** generally parallel with the machine direction MD, and wherein the second longitudinal side edge **130** is the leading edge and the first longitudinal side edge **128** is the trailing edge. The transfer assembly **244** may also change the speed at which the chassis **102** advances in the machine direction MD such that the speed of the advancing chassis matches the speed of the advancing substrates **206**, **208** advancing downstream. It is to be appreciated that various forms of transfer assemblies may be used with the converting apparatus disclosed herein, such as for example, the transfer assemblies disclosed in U.S. Pat. No. 7,587,966; U.S. patent application Ser. No. 13/447,531, filed on Apr. 16, 2012; U.S. patent application Ser. No. 13/447,544, filed on Apr. 16, 2012; U.S. patent application Ser. No. 13/447,568, filed on Apr. 16, 2012; and U.S. patent application Ser. No. 13/447,585, filed on Apr. 16, 2012.

As discussed below with reference to FIGS. **1**, **4**A, **4**D, **4**E, and **4**F, each chassis **102** is transferred from the transfer assembly **244** and combined with advancing, continuous first and second belt substrates **206**, **208**, which are subsequently cut to form first and second belts **106**, **108** on absorbent articles **100**.

Prior to joining each chassis **102** with the advancing, continuous first and second belt substrates **206**, **208**, the first and second belt substrates **206**, **208** may be cut from an advancing continuous belt substrate **205**. With reference to FIGS. **4**A, **4**E, and **4**F, upon cutting the first and second belt substrates **206**, **208** from the continuous substrate **205**, the advancing first and second belt substrates **206**, **208** are spaced apart in the cross direction CD at a web spacing device **212**. As discussed in more detail below, the first belt substrate **206** is spaced in the cross direction CD by a first web spacing device and the second elastic belt substrate **208** is spaced in the cross direction CD by a second web spacing device.

With reference to FIGS. **4**A, **4**G, and **4**H, each chassis **102** is transferred from the transfer assembly **244** to a nip **220** between the transfer assembly **244** and a carrier member **222** where the chassis **102** is combined with belt substrates **206**, **208**. The belt substrates **206**, **208** each define an inner, wearer facing surface **207** and an opposing, outer garment facing surface **209**. The inner, wearer facing surface **207** of the first belt substrate **206** may be combined with the outer, garment facing surface **134** of the chassis **102** along the first waist region **116**, and the inner, wearer facing surface **207** of the second belt substrate **208** may be combined with the outer, garment facing surface **134** of the chassis **102** along the second waist region **118**. As shown in FIG. **4**A, adhesive **190** may be intermittently applied by an adhesive applicator **192** to the inner, wearer facing surface **207** of the belt substrates **206**, **208** before combining with the discrete chassis **102** at the nip **220** between the transfer assembly **244** and the carrier member **222**.

With reference to FIGS. **4**A and **4**H, a continuous length of absorbent articles **204** are defined by multiple discrete chassis **102** spaced from each other along the machine direction MD and connected with each other by the belt substrates **206**, **208**. As shown in FIG. **4**A, the continuous length of absorbent articles **204** advances from the nip **220** to a folding apparatus **254**. At the folding apparatus **254**, each chassis **102** is folded in the cross direction CD along a lateral axis **126** to place the first waist region **116**, and specifically, the inner, body facing surface **132** into a facing, surface to surface orientation with the inner, body surface **132** of the second waist region **118**. The folding of the chassis **102** also positions the inner, wearer facing surface **207** of the second belt substrate **208** extending between each chassis **102** in a facing relationship with the inner, wearer facing surface **207** of the first belt substrate **206** extending between each chassis **102**.

As shown in FIGS. **4**A, **4**H, and **4**I, the folded discrete chassis **102** connected with the belt substrates **206**, **208** are advanced from the folding apparatus **254** to a bonder apparatus **256**. The bonder apparatus **256** operates to bond an overlap area **160**, thus creating bonded regions **166**. The overlap area **160** includes a portion of the second belt substrate **208** extending between each chassis **102** and a portion of the first belt substrate **206** extending between each chassis **102**. With reference to FIGS. **4**A, **4**I, and **4**J, the continuous length of absorbent articles **204** are advanced from the bonder apparatus **256** to a cutting device **258** where the bonded regions **166** are cut into along the cross direction CD to create a first side seam **178** on an absorbent article **100** and a second side seam **180** on a subsequently advancing absorbent article.

As discussed above, the present disclosure includes a web spacing device **212**. As shown in FIGS. **5**A and **5**B, the web spacing device **212** may include a frame **224** that is rotatable about a first axis of rotation **226** and a guide member **228** connected with the frame **224**. The frame **224** may define a first end portion **230** and a second end portion **232** separated by a central portion **234**. The guide member **228** may be configured in the form of first and second guide members **236**, **238**. The first guide member **236** may be connected with the first end portion **230** of the frame **224** and the second guide member **238** may be connected with the second end portion **232** of the frame **224**. The first and second guide members **236**, **238** may each define an outer surface **240**, **242** that are each configured to receive an advancing web.

With continuing reference to FIG. **5**A, the frame **224** may be associated with a first rotation member **259** that is configured to rotate the frame **224** about the first axis of rotation **226**. The first rotation member **259** may comprise a base **257** that is associated with a motor **260** and a sensor **262**. The first rotation member may be controlled using a closed-loop feedback control system, for example. The base **257** may be connected with the frame **224**. The base may be configured in various different ways. As discussed in more detail below, the sensor **262** of the first rotation member **259** may be configured to sense the cross-directional position of the machine direction centerline of an advancing web. If the machine direction centerline of the advancing web is positioned away from the target cross-directional position, the sensor **262** may communicate with the motor **260**. In turn, the motor **260** may rotate the frame **224** about the first axis of rotation **226** to align the machine direction centerline of the advancing web with the target cross-directional position. While it is shown that the first rotation member **259** comprises a base **257**, a motor **260**, and a sensor **262**, it is to be appreciated that the first rotation member **259** may comprise various components and may be configured to rotate the frame **224** in various other ways.

As shown in FIG. **5**A, the web spacing device **212** may also comprise a second rotation member **264**. The web spacing device **212** may also comprise an adapter member **266** that is configured to connect the second rotation member **264** with the frame **224**. The second rotation member **264** may be movably, or rotatably, connected with the adapter member **266** and/or the frame **224**. The web spacing device **212** may also comprise a support member **268** that connects the second rotation member **264** with a rigid support structure, such as a base, frame, or wall. The second rotation member **264** may be configured to rotate the frame **224** about a second axis of rotation **272**. The second axis of rotation **272** may be the same as, or different from, the first axis of rotation **226**. That is, the second axis of rotation **272** may be positioned in various locations relative to the frame **224**. While the positioning of the first and second axis of rotation **226**, **272** shown in FIG. **5**A are the same relative to the frame **224**, it is to be appreciated that the positioning of the second axis of rotation **272** relative to the frame **224** may be different from the positioning of the first axis of rotation **226** relative to the frame **224**.

As discussed above, the web spacing device **212** may be configured to control the cross-directional CD position of a web, such as the first belt substrate **206** shown in FIG. **6**, advancing in the machine direction MD. While the advancing web is described below as the first belt substrate **206**, it is to be appreciated that the advancing web may be the second belt substrate **208** shown in FIG. **4**F, or various other webs. As shown in FIG. **7**, sometimes during operation, the first belt substrate **206**, may undesirably shift in the cross direction CD as the first belt substrate **206** advances in the machine direction MD through the converting apparatus. If the first belt substrate **206** is not positioned in a predetermined cross-directional CD position, components of the resulting absorbent articles may be misaligned. As shown in FIGS. **6** and **7**, a web, such as the first belt substrate **206**, may define a machine direction centerline MDC that is equidistant from two opposing side edges **274***a*, **274***b* of the continuous web that extend in the machine direction MD. With reference to FIGS. **5**A, **5**B, **6**, and **7**, the web spacing device **212** may control the cross-directional CD position of the first belt substrate **206** by maintaining the machine direction centerline MDC of the first belt substrate **206** at a target cross-directional position T_{CD}, or within a predetermined distance of the target cross-directional position T_{CD}.

With reference to FIGS. **5**A, **5**B, and **7**, in operation, the first belt substrate **206** may advance in a machine direction MD onto the outer surface **240** of the first guide member **236** and subsequently advance onto the outer surface **242** of the second guide member **238**. From the second guide member **238**, the first belt substrate **206** may advance to various downstream operations. If the cross-directional CD position of the machine direction centerline MDC of the first belt substrate **206** is outside of the target cross-directional position T_{CD} as shown in FIG. **7**, the sensor **262** is configured to send a signal to the motor **260** of the first rotation member **259** to adjust the cross-directional CD position of the first belt substrate **206**. In response, the motor **260** causes the frame **224** to rotate about the first axis of rotation **226**. As shown in FIG. **5**B, as the frame **224** rotates, the position of the frame **224** relative to the first guide member **259**, and particularly, the base **257** of the first guide member **259**, changes. The motor **260** may be configured to rotate the frame **224** until the sensor **262** determines that the machine direction centerline MDC of the first belt substrate **206** is at the target cross-directional position T_{CD}, or within a predetermined distance of the target cross-directional position. The pre-determined distance may be, for example, within +/−10 millimeters of the target cross-directional position T_{CD}. As such, as the first belt substrate **206** advances in the machine direction MD downstream, the first belt substrate **206** may be in proper alignment to join the first belt substrate **206** with various other components of the absorbent article.

As previously mentioned, the web spacing device **212** may be configured to change the cross-directional CD position of a web, such as the first belt substrate **206**, advancing in a machine direction MD. With reference to FIGS. **8** and **9**, the second rotation member **264** of the web spacing device **212** may be used to rotate the frame **224** about the second axis of rotation **272**, which, in turn, shifts the target cross-directional position of the advancing first belt substrate **206** from a first target cross-directional position T_{CD1} to a second, different target cross-directional position T_{CD2}. As a result, as a first belt substrate **206** advances from the first guide member **236** to the second guide member **238**, the cross-directional CD position of the machine direction centerline MDC of the first belt substrate **206** shifts in the cross direction CD from a first actual cross-directional position P_{CD1} to a second actual cross-directional position P_{CD2}. The web spacing device **212** may shift the machine direction centerline MDC of the first belt substrate **206** by various cross-directional CD distances. That is, the first and second actual cross-directional positions P_{CD1}, P_{CD2} may be various distances apart. For example, the web spacing device **212** may shift the machine direction centerline MDC of the first belt substrate **206** by about 25 millimeters to about 300 millimeters, or about 50 millimeters to about 200 millimeters, in the cross direction CD. Moreover, the first rotation member **259** may be configured to control the cross-directional CD position of the first belt substrate **206** at the second target cross-directional position T_{CD2}, or within a predetermined distance from the second target cross-directional position T_{CD2}. As shown in FIGS. **9** and **10**, the second rotation member **264** may be configured to rotate the frame in two directions, A or B, to shift the target cross-directional position T_{CD} of the advancing web.

With continuing reference to FIG. **9**, the first rotation member **259** may be configured to rotate the frame **224** about the first axis of rotation **226** by a first angle of rotation and the second rotation member **264** may be configured to rotate the frame **224** about the second axis of rotation **272** by a second angle of rotation. The second angle of rotation may be greater than the first angle of rotation. That is, the second rotation member **264** is configured to cross-directionally shift an advancing web by a greater degree than the first rotation member **259**. As such, the web spacing device is capable of positioning an advancing web in various cross-directional positions for the production of various sizes of absorbent articles. For example, the first angle of rotation may be up to +/−10 degrees from vertical. The second angle of rotation may be up to +/−30 degrees, or up to +/−20 degrees, from vertical.

With reference to FIG. **9**, in order to change the target cross-directional position for the advancing web, the second rotation member **264** may be configured with a rotation aperture **276** and one or more locking members **278**. In some exemplary configurations, the locking members **278** may be connected with the adapter member **266** and may extend through the rotation aperture **276**. In other exemplary configurations not comprising an adaptor member, the locking members **278** may be connected directly with the frame **224** and may extend through the rotation aperture **276**. Each locking member **278** may be positioned in various locations along the rotation aperture **276** to adjust the orientation of the frame **224**. To change the target cross-directional position T_{CD} of the machine direction centerline of an advancing web, the locking member or members **278** of the second rotation member **264** are disengaged from the adapter member **266** and/or the frame **224**. Then, the frame **224** may be rotated about the second axis of rotation **272** in directions, A or B. As shown in FIG. **9**, as the frame **224** rotates, the position of the frame **224** relative to the second rotation member **264** changes. Once the frame **224** is in the desired position, the locking members **278** may be engaged with the adapter member **266** and/or the frame **224** to prevent the frame **224** from moving about the second axis of rotation **272** during operation. In some exemplary configurations, the second rotation member **264** may be used to manually rotate the frame **224**. However, it is to be appreciated that the second rotation member **264** may be operated in various ways.

Additionally, with reference to FIG. **10**, the second rotation member **264** may be shifted in the cross direction CD relative to the support member **268**. The support member **268** may include a plurality of connection apertures **280** and the second rotation member **264** may comprise a plurality of connection apertures **282** for connecting the second rotation member **264** with the support member **268**. The connection apertures **280** may be substantially rectangular or arcuate in shape. The second rotation member **264** may be connected with the support member **268** in various cross directional CD positions by shifting the connection apertures **282** of the second rotation member **264** in the cross direction CD relative to the connection apertures **280** of the support member **268**. It is to be appreciated that the second rotation member **264** may be connected with the support member **268** in various ways, including bolts or pins, for example. In some exemplary configurations, the second rotation member **264** and the support member **268** may be integrally formed. That is, the second rotation member **264** and the support member **268** may be combined into one element. The support member **268** may be configured in various ways to shift the second rotation member **264** in the cross direction CD.

As previously mentioned, with reference to FIGS. **9**, **11**, and **12**, the web spacing device **212** may be used to space to cross-directionally shift two webs by different degrees. For example, to shift a first web, shown in FIG. **11** as first belt substrate **206***a* for exemplary purposes only, advancing in the machine direction MD, the web spacing device **212** may be positioned in a first configuration by rotating the frame **224** about the second axis of rotation **272** using the second rotation member **264**. Then, the first web may advance in the machine direction MD onto the web spacing device **212** in the first configuration. The web spacing device **212** may shift the machine direction centerline MDC of the first web in the cross direction CD and align the machine direction centerline MDC of the first web with a first target cross-directional position T_1 while changing the actual cross-directional position of the first web from the first actual cross-directional position P_{CD1} to the second actual cross-directional position P_{CD2}. Then, to shift a second web advancing in the machine direction MD, the web spacing device **212** may be positioned in a second configuration by rotating the frame **224** about the second axis of rotation **272** using the second rotation member **264**. The second configuration is different from the first configuration. The second web, shown in FIG. **12** as first belt substrate **206***b* for exemplary purposes only, may advance in the machine direction MD onto the web spacing device **212**. The web spacing device **212** may shift the machine direction centerline MDC of the second web in the cross direction CD and align the machine direction centerline MDC of the second web with a second target cross-directional position T_2, while changing the actual cross-directional position of the second web from the first actual cross-directional position P_{CD1} to the second actual cross-directional position P_{CD2}. The second target cross-directional position T_2 is different from the first target cross-directional position T_2. That is, the web spacing device **212** may be configured to shift the second web in the cross direction CD by a greater degree than the web spacing device **212** shifts the first web in the cross direction CD.

In some exemplary configurations, such as shown in FIG. **13**, the converting apparatus of FIG. **4** may include a first web spacing device **214** and a second web spacing device **216**. As shown in FIG. **13**, the first and second web spacing devices **214**, **216** may be configured to adjust the cross-directional CD distance between the machine direction centerline MDC of a first continuous belt substrate **206** and second continuous belt substrate **208** advancing in the machine direction MD from a first cross-directional distance D_{CD1} to a second cross-directional distance D_{CD2}. In particular, with reference to FIGS. **13** and **14**, the first web spacing device **214** may be configured to shift the cross-directional CD position of the machine direction centerline MDC of the first continuous belt substrate **206** in a first cross direction, such as directions C and E shown in FIGS. **13** and **14**, and the second spacing device **216** may be configured to shift the cross-directional CD position of the machine direction centerline MDC of the second continuous belt substrate **208** in a second cross direction, such as directions D and F shown in FIGS. **13** and **14**. The first directions C, E may be opposite the second cross directions D, F.

In some exemplary configurations, such as shown in FIG. **14**, the first and second cross directions C, E and D, F may converge, while in other exemplary configurations, such as shown in FIG. **13**, the first and second cross directions C, E and D, F may diverge. For example, with reference to FIGS. **4**F and **13**, the first and second web spacing devices **214**, **216** may be used to separate the first and second belt substrates **206**, **208** in the cross direction CD. In other exemplary configurations, such as shown in FIGS. **14** and **15**, the first and second web spacing devices **214**, **216** may be configured to bring the first and second belt substrates **206**, **208** closer together in the cross direction CD. For manufacturing different size absorbent articles, the first and second web spacing devices **214**, **216** may be configured to space the first and second belt substrates **206**, **208** by various degrees. For example, the cross-directional distance between the machine direction centerlines MDC of the first and second belt substrates **206**, **208** may increase as the size of the absorbent article increases.

While the web spacing device **212** or devices **214**, **216** may be arranged in a substantially vertical orientation, such as shown in FIGS. **5**A, **9**, and **10**, it is to be appreciated that the web spacing device **212** or devices of the present disclosure may be arranged in a substantially horizontal orientation, such as shown in FIGS. **16** and **17**.

With reference back to FIG. **5**A, the guide member **228** may be configured as first and second guide members **236**,

238. As shown in FIG. **5**A, each guide member **236**, **238** may be in the form of an idler bar. The idler bars may be rotatable, or the idler bars may be stationary. It is to be appreciated that the guide member **228** may be configured in various ways. For example, each guide member **228** may be configured as an idler bar, roller, conveyor, or the like. In some exemplary configurations, the guide member **228** may have a single, unitary outer surface. For example, the guide member **228** may be configured as a conveyor or a series of conveyors having a unitary outer surface.

With reference to FIG. **5**A, the frame **224** may be configured to join a first guide member **236** with a second guide member **238**. However, it is to be appreciated that the frame **224** may be configured in various ways depending upon the configuration of the guide member **228** or guide members. Likewise, various motors may be used to rotate the frame **224** about the first axis of rotation **226**. In addition, various sensors may be used to sense the cross-directional CD position of the machine direction centerline MDC of the advancing web. An exemplary frame, motor, and sensor are available from Erhardt+ Leimer under the designation Pivoting Frame, model DR 3111.

The dimensions and values disclosed herein are not to be understood as being strictly limited to the exact numerical values recited. Instead, unless otherwise specified, each such dimension is intended to mean both the recited value and a functionally equivalent range surrounding that value. For example, a dimension disclosed as "40 mm" is intended to mean "about 40 mm."

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While particular embodiments of the present invention have been illustrated and described, it would be obvious to those skilled in the art that various other changes and modifications can be made without departing from the spirit and scope of the invention. It is therefore intended to cover in the appended claims all such changes and modifications that are within the scope of this invention.

What is claimed is:

1. An apparatus for controlling cross-directional movement of a web advancing in a machine direction, wherein the web defines a machine direction centerline, the apparatus comprising:

a frame having a first end portion and a second end portion separated by a central portion, wherein the frame is rotatable about a first axis of rotation;

a first rotation member movably connected with the frame, wherein the first rotation member is configured to rotate the frame by a first angle of rotation about the first axis of rotation; and

a second rotation member movably connected with the frame, wherein the second rotation member is configured to rotate the frame about a second axis of rotation by a second angle of rotation, wherein the second angle of rotation is greater than the first angle of rotation, and wherein the second rotation member comprises a rotation aperture and a locking member, wherein the locking member is connected with the frame and extends through the rotation aperture.

2. The apparatus of claim **1** further comprising a first guide member connected with the first end portion of the frame and a second guide member connected with the second end portion of the frame, wherein the first and second guide members each have an outer surface.

3. The apparatus of claim **2**, wherein the first and second guide members are idler bars.

4. The apparatus of claim **2**, wherein the outer surface of the first guide member is configured to receive the advancing web, wherein the outer surface of the second guide member is configured to receive the web advancing from the outer surface of the first guide member.

5. The apparatus of claim **1**, wherein the first rotation member comprises a motor, wherein the motor is configured to rotate the frame about the first axis of rotation to align the machine direction centerline of the advancing web with a target cross-directional position.

6. The apparatus of claim **5**, wherein the second rotation member is configured to rotate the frame about the second axis of rotation to adjust the target cross-directional position from a first target cross-directional position to a second target cross-directional position that is different from the first target cross-directional position.

7. The apparatus of claim **1** further comprising an adaptor member that is configured to connect the frame with the second rotation member.

8. The apparatus of claim **1**, wherein the first axis of rotation and the second axis of rotation are the same.

9. The apparatus of claim **1**, wherein the first rotation member further comprises a sensor configured to detect the cross-directional position of the machine direction centerline of the web.

10. The apparatus of claim **1** further comprising a support member adjustably connected with the second rotation member, wherein the second rotation member is adjustably connectable with the support member in various cross-directional positions.

11. The apparatus of claim **1**, wherein the second rotation member is configured to manually rotate the frame about the second axis of rotation.

12. The apparatus of claim **1** further comprising a first web spacing device and a second web spacing device, wherein each web spacing device comprises a frame rotatable about a first axis of rotation; a first rotation member movably connected with the frame and configured to rotate the frame by a first angle of rotation about the first axis of rotation; and a second rotation member movably connected with the frame and configured to rotate the frame by a second angle of rotation about a second axis of rotation, wherein the second angle of rotation is greater than the first angle of rotation, wherein the first web spacing device is configured to shift a first advancing web in a first cross direction and the second web spacing device is configured to shift a second advancing web in a second cross direction, wherein the first cross direction is opposite the second cross direction.

13. An apparatus for controlling cross-directional movement of a web advancing in a machine direction, wherein the web defines a machine direction centerline, the apparatus comprising:

a frame having a first end portion and a second end portion separated by a central portion, wherein the frame is rotatable about a first axis of rotation;

a first rotation member movably connected with the frame, wherein the first rotation member is configured to rotate the frame by a first angle of rotation about the first axis of rotation, and wherein the first rotation member is configured to align a machine direction centerline of an advancing web with a target cross-directional position; and

a second rotation member movably connected with the frame, wherein the second rotation member is configured to rotate the frame about a second axis of rotation by a second angle of rotation, wherein the second angle of rotation is greater than the first angle of rotation, and wherein the second rotation member is configured to adjust the target cross-directional position from a first target cross-directional position to a second target cross-directional position that is different from the first target cross-directional position.

14. The method of claim **13**, wherein the first rotation member comprises a motor, wherein the motor is configured to rotate the frame about the first axis of rotation.

15. The apparatus of claim **13**, comprising a first web spacing device and a second web spacing device, wherein each web spacing device comprises a frame rotatable about a first axis of rotation; a first rotation member movably connected with the frame and configured to rotate the frame by a first angle of rotation about the first axis of rotation; and a second rotation member movably connected with the frame and configured to rotate the frame by a second angle of rotation about a second axis of rotation, wherein the second angle of rotation is greater than the first angle of rotation, wherein the first web spacing device is configured to shift a first advancing web in a first cross direction and the second web spacing device is configured to shift a second advancing web in a second cross direction, wherein the first cross direction is opposite the second cross direction.

16. The apparatus of claim **13**, comprising an adaptor member that is configured to connect the frame with the second rotation member.

17. The apparatus of claim **13**, wherein the first axis of rotation and the second axis of rotation are the same.

18. An apparatus for controlling cross-directional movement of a web advancing in a machine direction, wherein the web defines a machine direction centerline, the apparatus comprising:

a frame having a first end portion and a second end portion separated by a central portion, wherein the frame is rotatable about a first axis of rotation;

a first rotation member movably connected with the frame, wherein the first rotation member is configured to rotate the frame by a first angle of rotation about the first axis of rotation; and

a second rotation member movably connected with the frame, wherein the second rotation member is configured to rotate the frame about a second axis of rotation by a second angle of rotation, wherein the second angle of rotation is greater than the first angle of rotation; and

a first web spacing device and a second web spacing device, wherein each web spacing device comprises the frame, wherein the first web spacing device is configured to shift a first advancing web in a first cross direction and the second web spacing device is configured to shift a second advancing web in a second cross direction, wherein the first cross direction is opposite the second cross direction.

19. The apparatus of claim **18**, wherein the first axis of rotation and the second axis of rotation are the same.

20. The method of claim **18**, wherein the first rotation member comprises a motor, wherein the motor is configured to rotate the frame about the first axis of rotation.

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